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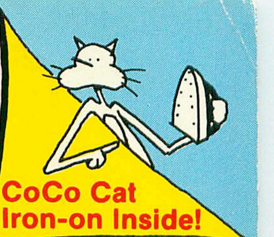

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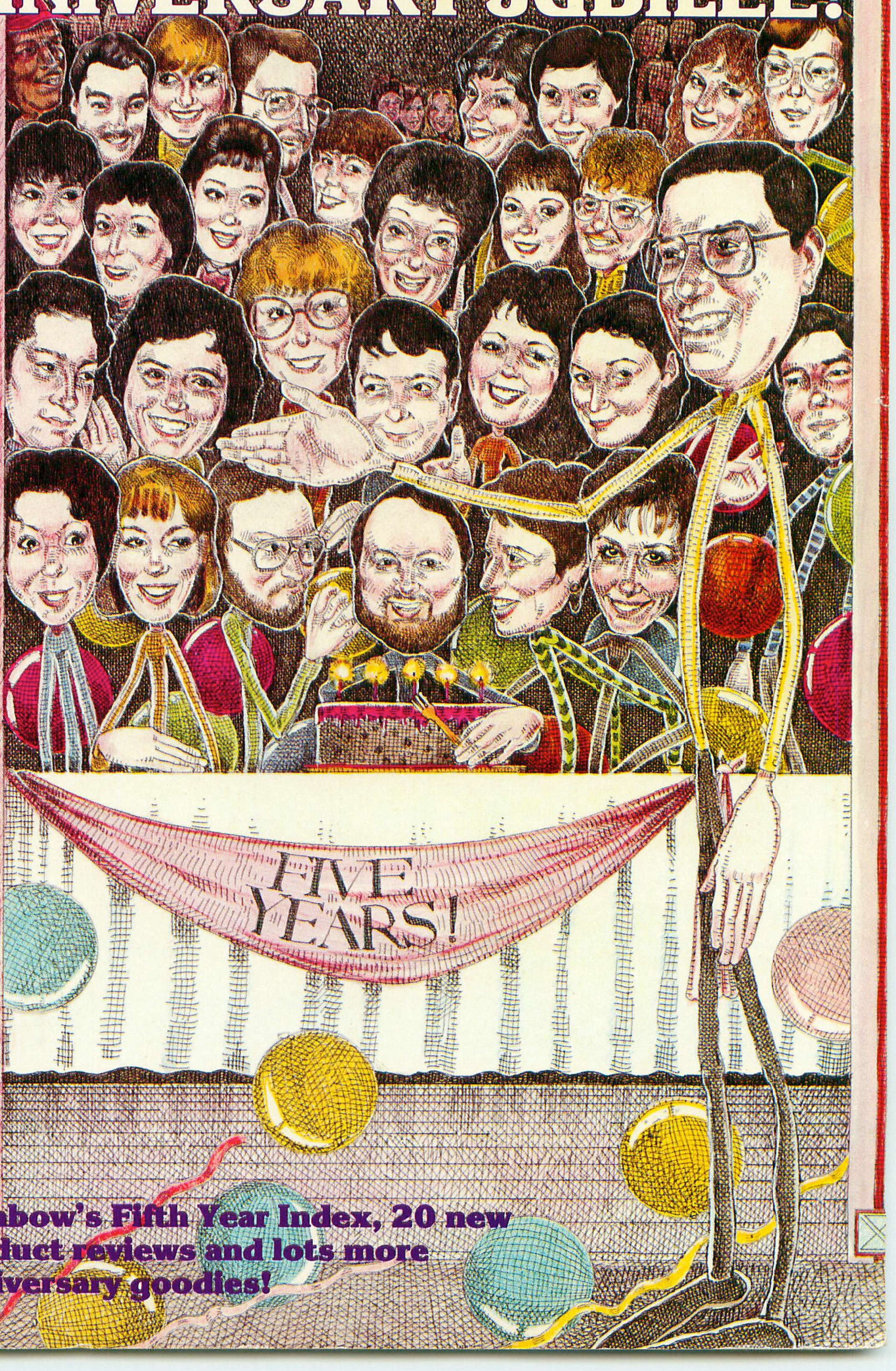

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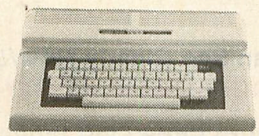

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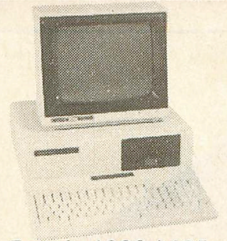

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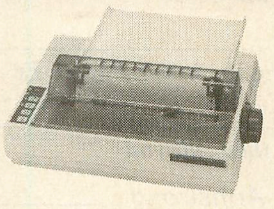

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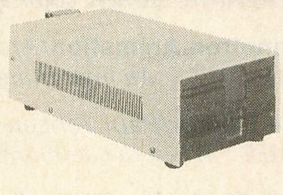

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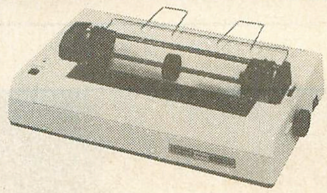

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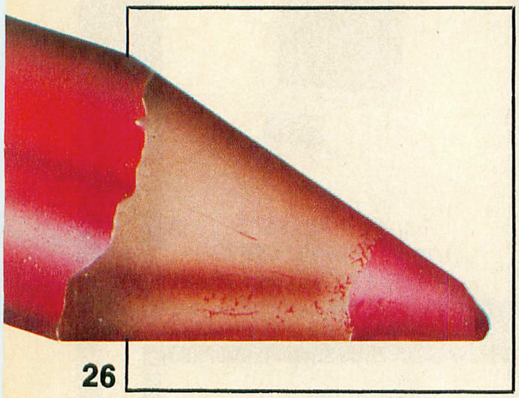
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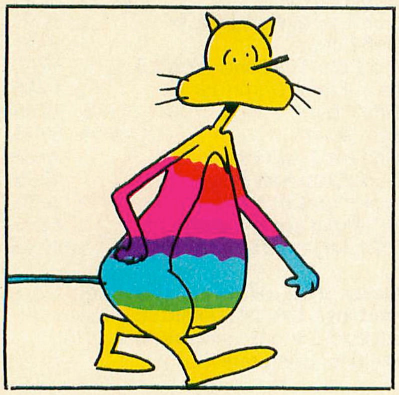
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Cover illustration
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📼 The small cassette tape symbols beside features and regular columns indicate that the program listings with those articles are on this month's RAINBOW ON TAPE, ready to CLOAD and RUN. For full details, check our RAINBOW ON TAPE ad on Page 147.

NEXT MONTH: Our action-packed Games issue will require your deepest concentration so you'll not be in jeopardy of losing our many challenging offerings. We had our checkers looking for "chess" the right amusements for your delight, and what they came up with is no charade. No password is needed to enjoy our festive diversions, but avoid a monopoly of the issue to ward off a family feud.

The price is right so Simon says to follow the leader to THE RAINBOW, the number one information source for the Color Computer.

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July 1986 Vol. V No. 12

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LETTERS TO THE RAINBOW

Candid CoCo

Editor:

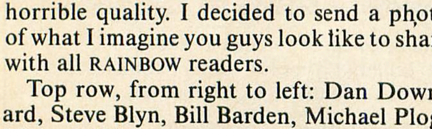
I was reading the "Letters to the Rainbow" section in the December 1985 issue when I saw Bill Bernico's letter asking you to show the staff's faces. I took a fast look at the portrait you showed and noticed the horrible quality. I decided to send a photo of what I imagine you guys look like to share with all RAINBOW readers.

Top row, from right to left: Dan Downard, Steve Blyn, Bill Barden, Michael Plog, Richard White, Joseph Kolar and Richard Ramella.

Bottom row from left to right: Dale Puckett, Tony DiStefano, Lonnie Falk (the one with the punched nose), Jutta Kapfhammer, Fred Scerbo and Jim Reed. (Lonnie Falk was punched to put his head in place. He was getting crazy about his CoCo, even talking to it!)

Fabio Luis De Paoli
Sao Paulo, Brazil

Your drawing comes close. Hope you like this month's cover.



BACK TALK

Editor:

In the January 1986 "Letters," [Page 6] Mr. Garrett writes about standardization of programs and documentation. I agree with him completely. But, until that magic day arrives and our fantasies materialize, I have a suggestion about the oddball sizes of manuals for our software. Get a large three-ring binder. Use the largest size three-ring plastic pencil holders to hold smaller pamphlets. The 8½ by 11 clear plastic sheet protectors hold several normal size pages. Now, when I take down my ECB manual, I'm not rained on by other things!

I also want to thank Mrs. White for a hint many months ago about using 3 by 5-inch cards and a recipe box for hints and short program notes. If you include page number, month and year of RAINBOW, it's easy to go directly to the source without thumbing through all the magazines.

Please start RAINBOW ON DISK. Thank you for a wonderful magazine.

Christine Terrio
Bothell, WA

One Man's Junk . . .

Editor:

I read Basil Garrett's letter [Page 6] in the January 1986 issue. He said 60 to 70 percent of the programs he has for the CoCo are junk. I think the CoCo is a very good system and the programs made for it are also very good. If he or anyone else thinks some of their programs are junk then send them to me. I would be grateful for the opportunity to get some new software. My address is P.O. Box 482, 46157.

Tony Bonnet
Monrovia, IN

CoCo Compared

Editor:

I was amazed at the word "envious" in Tom Heiliger's letter [Page 6] in the February 1986 issue. Therefore, to make things clearer, I have decided to compare the Amiga, the CoCo, the Mac and the Atari 520ST.

First of all, let's check out the microprocessors. Amiga, 16 bit; 520ST, 16 bit; Mac, 16 bit; and CoCo, 16 bit.

Amount of voices generated by popular sound programs: Amiga, four voices; 520ST, four voices; Mac, four voices; and CoCo, 12 voices.

Maximum display of on-screen text generated by popular word processing programs: Amiga, 80 * 24; 520ST, 80 * 24; Mac, 80 * 24; and CoCo, 85 * 24.

Memory: Amiga, expandable to 256K; 520ST, expandable to 512K; Mac, expandable to 512K; and CoCo, expandable to 512K.

That about sums up everything. As for software and support, there is no comparison because the other machines haven't been around long enough.

By the way, THE RAINBOW is the largest magazine dedicated to one computer in existence. No other source gives you more information.

Tio Babich
Miller Place, NY

Valuation is Complex

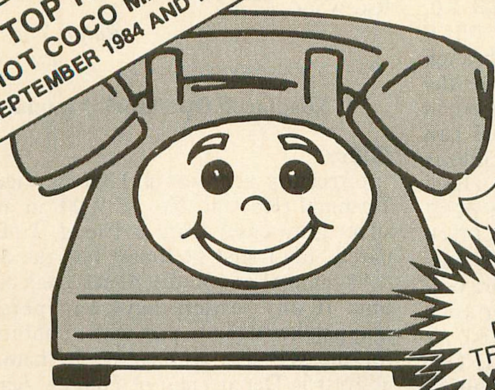
Editor:

I trust your April 1986 article "House Value" [Page 79] was done *tongue in cheek* and has been accepted that way by your readers. While the author may have been frustrated in the inconsistency of the free advice he received, he has not stumbled upon a shortcut to property valuation. It might at times yield a figure that reflects current value, but so is a fortune-telling game accurate some of the time.

An appraiser is trained to analyze current market information (sales, listings, building costs, financial trends, etc.) and provide a logical estimate of value to guide a prospective buyer, seller or lender. Reliance on a historic assessed value and an inflation factor unrelated to the neighborhood (let alone city or state) where the home is located will yield only an assessed value updated for inflation.

Glenn W. Bridger, ASA
Madison, WI

TOP RATINGS
HOT COCO MAGAZINE
SEPTEMBER 1984 AND MAY 1985



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SWEET TALKIN'

KEY-BEEP can be on/off. Unacceptable keystrokes cause a lower pitched BOP! This ERROR-BEEBOP can be on/off.

Talks to other computers with Full or Half Duplex; Baud Rate of 110, 150, 300, 600, 1200; Parity as even, odd, mark, space, none; 7 or 8 bit Word; any Stop Bits; all 128 ASCII characters; true line Break; XON/XOFF protocol; and optional line-at-a-time transmission. Able to send and receive text, block graphics, BASIC and ML programs. A 64K machine holds up to 45,000 characters (33,300 in HI-RES).

DUAL PROCESSING lets you review & edit while more data is coming in.

XMODEM for disk file transfer.

Fully supports D.C. Hayes and other intelligent modems.

Talks to your printer with any page size, margins, line spacing, split word avoidance. Embed your printer's control sequences for boldface, underlining, etc. Narrow text can be automatically spread out.

You'll also use Autoterm for simple word processing and record keeping

You can display directories, delete files, transmit directly from disk, and work with files larger than memory. Easily maintain a disk copy of an entire session.

Compatible with TELEWRITER (ASCII) & other word processors.

SMOOTH WALKIN'

AUTOTERM moves smoothly and quickly between word processing and intelligent terminal action. Create text, correct your typing errors; then connect to the other computer, upload your text, download information, file it, and sign-off; then edit the received data, print it in an attractive format, and/or save it on file.

Editing is super simple with the cursor. Find strings instantly, too! Any operating parameter, such as screen width, can be altered at any time. Uncompleted commands can be cancelled.

PUTTY IN YOUR HANDS

The word processor can be used to create, print, and/or save on file your personal KSMs. They let AUTOTERM act like you. For example, it can dial through your modem, sign-on, interact, perform file operations, & sign-off; an entire session without your help. KSMs can answer the phone, prompt the caller, take messages, save them, hang-up, and wait for the next call. The KSM potential is unbelievable!

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Graham, *RAINBOW*, 6/83

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Banta, *HOT CoCo*, 9/84

"Almost a full featured word processor..."
Ellers, *RAINBOW*, 11/84

"AUTOTERM's excellent error-handling routines, thorough documentation, and logical, easy-to-use command structure make it stand out."
Parker, *HOT CoCo*, 5/85

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Disk Zapper to the Rescue

Editor:

This is to comment on Bill Bernico's letter, March 1986, Page 7.

Richard Duncan wrote on the communications programs, *CoBBS*, January 1986 [Page 142]. He pointed out difficulties attendant to using the programs from disk, transferred from tape.

Any of the zap programs, but specifically, *Quick Zap*, December 1985 [Page 118] makes the change of the offending slash to an alpha or numeric character easy. With the revised title, you are home free.

Merle Miller
Albuquerque, NM

Editor:

This is in reply to the letter from Bill Bernico in the March 1986 issue. He transferred some programs from tape to disk and found some of the files had illegal names making them impossible to load (e.g., *SCF/EDI* on tape became *SCF/EDI/BAS* on disk).

You do not need to reformat the disk and start all over again. All you need is a disk zapper program that lets you rename the files in the directory. There are several available that will handle the job, including *VIP Disk Zapper*, Sonburst's *Sector Inspector* (now sold by Tom Mix), Spectrum's *Disk Utility*, or Kolesar's *XTD*.

Every disk user should own at least one of these valuable programs. As a personal preference, I favor a combination of *Sector Inspector* and *Disk Utility. TXD* is somewhat less sophisticated than the others, but worth considering for its relatively low price.

Neil Edward Parks
Beachwood, OH

HINTS AND TIPS

Editor:

I have just purchased a Canon Typestar 7 that doubles as a typewriter and printer. It is limited as a printer. However, I am able to print out my programs with it and it works with *Telewriter-64*.

Using Canon's Serial Interface-30 I have been able to run it with the CoCo 2 ECB. The following hookup works: Standard RS-232 plug into Canon Interface — jump pins 20 and 6. CoCo Pin 2 to RS-232 Pin 4. CoCo Pin 3 to RS-232 Pin 7. CoCo Pin 4 to RS-232 Pin 3.

The Typestar 7 accepts ASCII Code. Hope this will help someone else.

Alfred H. Johnson
Kaaawa, HI

POKE Corrects Infinite Looping

Editor:

Despite Microsoft's correction of `LEAX -100,S` (DECB 1.0) to `LEAX -$100,S` (DECB 1.1) in the `COPY` routine, they have still failed to correct the problem of locking when an error disrupts a `COPY` in progress. The files are opened for direct access, but are not handled in the usual way for such files. Thus, when an attempt is made to close the file prematurely, the file pointers have unexpected values, causing infinite looping.

To bypass this problem in the 64K all-RAM mode of operation, for DECB 1.0, `POKE &HCAE6;` for DECB 1.1, `POKE &HCBB8, 36`. This changes a BEQ (branch if equal) to a BHS (branch if higher or the same). Having made similar oversights in assembly language programming, I can easily understand the ease of introducing, as well as the difficulty in detecting such a bug. After a `COPY` error, `POKE &H948, 9: POKE &H949, 137: POKE &H94A, 10: POKE &H94B, 137` to prevent the OB error message. I don't have a patch for that part yet.

Another useful 64K `POKE`: prior to a `BACKUP`, `POKE X, 32` and afterward `POKE X, 39` (`X = &HD60C` for 1.0 `&HD6FF` for 1.1. This will cause I/O errors to be ignored during the backup, so partially crashed disks can be salvaged.

Jerry Miller
E. Setauket, NY

FC Errors Result of Typos

Editor:

I have heard from several readers about errors in *Gopher It* [January 1986, Page 18]. These errors are a result of typos and not the program itself. Many beginners are stumped by such errors (and rightly so). These errors are very deceiving because they tell you to look in the wrong spot. The solution is to double-check *every* line in the program before running it the first time. RAINBOW makes this easy to do because programs are listed in the same 32 character width format. Remember, every line needs to be checked, every blank space is important and every comma is necessary.

RAINBOW ON TAPE solves all problems and saves hours of typing. Beginners have much to learn, however, from typing in programs themselves. Not only will they learn new programming techniques, but trouble-shooting these nuisance errors will do wonders for their deductive powers of reasoning.

Steve Sward
Bellevue, NE

REQUEST HOTLINE

Editor:

I own a CoCo 2 64K and I'm a farmer in Saskatchewan. There are two things I would like to ask. First, are there any farm programs out there for the CoCo 2? If so, where can I get them? Second, I would like to know if someone can tell me if there is a communication program I can find in Winnipeg, Canada for *Grass Roots*, a farm database. If not, would someone be interested in writing one? Let me know. My address is Box 303, S0E 0A0.

Francis Rodier
Arborfield, Saskatchewan

Making the Grade

Editor:

I am a teacher and I'm looking for a grade book program and a good screen dump program that works on a DMP-105. If anyone has any of these programs, please let me know. Send correspondence to 3203 Ricewood, 77365.

Ralph Traynham
Porter, TX

Misplaced Operator's Manual

Editor:

I recently acquired a TRS-80 Videotex Terminal (RS Cat. No. 26-5000, in an old silver-gray case) from a friend. Unfortunately, my friend no longer had the operator's manual and Radio Shack can't supply one. If any readers have an operator's manual they'd like to part with or photocopy for me, I'd like to hear from them. My address is Department of Political Science, 223 Derby Hall, Ohio State University, 43210.

Thomas W. Holloway
Columbus, OH

Service Station Programs Needed

Editor:

I would like to correspond with any of your readers who have used the CoCo 2 in their garage or service station business. I want to computerize my husband's inventory and accounting systems. Tips and help are requested; particularly programs you feel are best suited to our industry. Please write to P.O. Box 1729, L3Z 2B9.

Mrs. Paul Campbell
Bradford, Ontario

INFORMATION PLEASE

Editor:

Can you tell me where I can find or get a tape to disk program? I have a year's supply of RAINBOW but I have never seen this program.

Edward R. Dillon
Huber Heights, OH

"A Tape to Disk Transfer Vehicle" can be found on Page 48 of the January 1984 issue.

Spreadsheet Search

Editor:

If anyone of your readers can direct me to a spreadsheet that works with J-DOS and perhaps a PBJ *Word-Pak II*, I would appreciate hearing about it. My address is 2843 West 40th Street, 60632.

Kenneth Siwicki
Chicago, IL

No Keyboard Letter

Editor:

My CoCo 2 is 64K ECB and is the CoCo 1 size: long back with ventilation on sides. What keyboard letter is it (E,F)?

Charlie Benziger
Exeter, NH

There is no such reference as "keyboard letter." However, the circuit board is probably an 'F' board.

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1983
PROGRAMS

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A utility to print directory on paper
$9.95

New Lower Price Un-DISK Drives ~~$49.95~~? $34.95

You Bet! There are empty spaces in your 32K and 64K CoCo. The Preble VDOS Un-DISK helps you fill them up with PROGRAMS!

- Un-DISK uses your computer's extra memory like a fast disk drive.
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- Un-DISK will work even if you already own a disk but WHY BUY A DISK AT ALL?
- Un-DISK should be in the library of every serious CoCo user even if you own a disk says Frank J. Esser, independent reviewer for RAINBOW Magazine!

OK sure, disk drives ARE NICE. I own one. But if your finances are limited, the Un-DISK can give you much of the power of the mechanical drive. Even if you already own a disk the Un-DISK can work like a super fast extra disk.

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Line Packing Problems

Editor:

I have had trouble entering several of your longer one- and two-liners. I can type all but the last one or two characters. The cursor is still flashing but CoCo will not take any further additions. I have tried omitting the space after the line number, but CoCo puts the space back in when I try to run or list. Any suggestions?

Maryann Moore
Brunswick, GA

> *This problem is known as line packing. Just enter as much of the line as you can and then use the edit mode "extend" command to enter the last few characters.*

A Patch for *DeskMate*

Editor:

I would like to know if anyone has come up with a patch to use *DeskMate* with Radio Shack's DMP-105 printer at 2400 Baud. I also want to know if anyone has a patch for speeding up the disk drive stepping rate for versions 1.01.00 and 2.00.00 of OS-9. Please contact me at 911 North Grand Avenue, 72160.

J. R. Waggoner
Stuttgart, AR

> *See* The Complete Rainbow Guide to OS-9 *for Version 1.01 alterations. Also, keep an eye on "Kissable OS-9" for* DeskMate *and Version 2.0 modifications.*

THE RAINBOW QUEST

There I was, stuck at home with the flu,
I had solved all my Adventures, and there was nothing to do.

The mailman drove up to my house
in his truck,
And suddenly, I had been blessed with some very good luck.

I ran out of my room, and tripped
on the stair,
I just had to know — was RAINBOW there?

I felt that happiness was very near,
And when I found RAINBOW, I shouted,
"It's here! It's here!"

With Lonnie Falk, Fred Scerbo and
Tamara Dunn,
I just have to say, "RAINBOW, you're
Number One!"

Ryan Hushion
Massapequa Park, NY

Customized Teacher's Aid

Editor:

I am a chemistry professor at Saginaw Valley State College. I had a program that recorded and did grades on an Apple. I was never very happy with the program; it was just not easy to use. Then, *Teacher's Aid* by Garry L. Shelton appeared in the September 1985 issue of RAINBOW [Page 46]. It is a useful program, however, there are several parts of the program that were of little use to me and it lacked some things I needed, so I changed it.

I raised the limit for number of grades to 110. I added a routine that allows grades to be printed either with student names and numbers, or with student numbers alone. I added a section that calculates the mean and median for each test. As part of the printout routine, the program prints out how many students fall into each of the grade ranges: 100-90, 89-80, 79-70, 69-60, 59-50 and below 50. Finally, I added a routine that sorts grade totals from highest to lowest and prints them. I use this in calculating final grades.

I eliminated the section on display data, since that can be done through the Enter Data or Print Data sections. I eliminated the Drop Lowest Grade routine, because the Enter Data part is so easy to use that I can drop the lowest grade and enter the final exam score at the same time. I left the Enter Data section alone, except to remove Letter Grade, Days Absent and Percent Absent.

If my modifications can be of use to anyone, write to me at 6383 Leven Drive, 48604 and I'll send a listing, or send me a blank tape and I'll `CSAVE` it for you.

George W. Eastland, Jr., Ph.D.
Saginaw, MI

International Rainbow

Editor:

I was telling my friends about THE RAINBOW and how I'm getting pen pal mail from all over the U.S. and Canada. Today I got a letter from Peru. I've seen letters in this column from Australia, Japan, Germany, and the Netherlands, to name a few. Just how widespread *is* RAINBOW's audience? Could you print a list of the countries that know about or receive your magazine? Obviously, it's more than just a national publication.

Bill Bernico
Sheboygan, WI

Arabian Gulf
Argentina
Australia
Austria
Bahamas
Belgium
Bermuda
Brazil
Canada
Central Africa
Chile
Columbia
Denmark
Dominican Republic
Egypt
El Salvador
Fiji
Finland
France
Germany
Great Britain
Haiti
Holland
Honduras
Hong Kong
Israel
Italy
Japan
Malta
Mexico
Netherlands
New Guinea
New Zealand
Norway
Panama
Philippines
Poland
Saudi Arabia
Scotland
Singapore
South America
Spain
Sweden
Switzerland
Trinidad
USSR
Venezuela
West Germany
West Indies

CoCo Gallery on Tape

Editor:

I love the "CoCo Gallery" and would like to have some of the listings. I understand the listings are too long to be included on RAINBOW ON TAPE, but could you include the first-place picture? It would be a nice addition to the already great RAINBOW ON TAPE.

I want to thank Roy Geeo (March 1986, Page 7) for that helpful `POKE`.

If anyone is interested in a good monthly newsletter that does not cost much, I suggest *Dynamic Color News* by Dynamic Electronics Inc. (ad in March 1986, RAINBOW, Page 91).

Neil Edge
Williston, FL

Newsletter Debut

Editor:

I want to announce the *Lewis Clark Exchange* newsletter. It offers programs, reviews and articles. Subscription is $10 a year in the U.S., $14 in Canada/Mexico and $18 overseas. The address is 1130 Bryden Avenue, 83501.

Leslie Miller
Lewiston, ID

KUDOS

Editor:

Thanks to THE RAINBOW, a complete journal of programs, listings, and information — a CoCo I have, a CoCo I shall always have! Thanks, and keep me on the edge of my seat!

Kevin Hobbs
Shelburne, Nova Scotia

BOUQUETS

Editor:

Please let me take this opportunity to publicly thank the staff of Speech Systems for their help in repairing my *Voice Pak*. I have owned their *Voice Pak* for a year now and when something went wrong, I mailed it back and it was returned good as new in less than a month at no charge. Thank you to Rich Parry and all the people at Speech Systems. You provide great support for your product.

Sgt. Christopher L. Cheshire
Travis AFB, CA

Quick Service Appreciated

Editor:

I recently purchased a dual disk drive from ELI Heffron & Sons, Inc., and received the drive two days later. I'd call that good service.

Phil Levesque
Lewiston, ME

Editor:

I would like to express my thanks to one of your advertisers, True Data Products. They sold me an SG-10 printer. It was great to receive it within one week.

David Eckrot
Tillsonburg, Ontario

CoCo's Force: THE RAINBOW Network

Editor:

THE RAINBOW network and our CoCos are better than any of us ever thought they would be. Case in point: I have been using *CAIS*, a checkbook reconciliation program by After Five Software, for the past two months.

I have used the system on six different accounts with as many as 200 transactions on each. I had a few questions initially and was able to receive immediate help by directly calling the programmer of this software. I suggested there needed to be a way of editing the checkbook balance.

Behold, two weeks later I received a diskette and printed instructions for upgrading the software. Where else but our own CoCo/RAINBOW and independent network of programmers can you get that attention and service? By the way, there was no charge for the upgrading. This program has saved me hours and hours of time and my tax preparer loves it, too. It was an ad in RAINBOW that led me to this software.

Richard J. Lederman
Bakersfield, CA

We welcome After Five Software as a new advertiser starting with us this month.

A Nice Way to Do Business

Editor:

A note of thanks for your promotion in December 1985. Following receipt of your coupons, I received assorted goodies and catalogs. Many in time for Christmas. What fun!

I purchased *CoCo Writer II* from Moreton Bay and thought I might pass along a bit of its pleasures.

I sent my order in over a holiday weekend. Despite this, I received my program in less than a week. One of the programs had a flaw and, upon notification, a new one was sent by return mail. I had some difficulty with the program and, again, received an immediate, most courteous response. What a nice way to do business.

Dolores Rosenthal
Los Angeles, CA

PEN PALS

Editor:

I am in search of a CoCo pen pal who is willing to teach me how to program in machine language. I have pretty well mastered BASIC programming (except for the `USR` and `DEFUSR` commands). I am 15 years old and have a 64K Color Computer 2, disk drive, cassette recorder and a Microline 83/A printer. You can contact me at 1859 East 8th Street, 85203-6649.

If anyone can tell me where I can get a good screen dump program for the Microline 83/A printer, please contact me.

Andrew Bartils
Mesa, AZ

- I've been a proud owner of the CoCo 2 for three years. I would like to know if there is a BBS in the Fresno area. If there is, please write or call. My address is 607 E. Magill, 93710; my phone number is (209) 432-7230.

Mike Cycon
Fresno, CA

- I am looking for a pen pal. I am 11 years old and own a TRS-80 MC-10 computer. Please write me at 7287 S. Clermont Drive, 80122.

Greg Carrasco III
Littleton, CO

- I would like to contact some RAINBOW subscribers who have programmed lotto programs with success. Write me at 4908 Cypress Drive, 60162.

Joseph Dooley
Hillside, IL

- Anyone wanting a pen pal can write me. I will do my best to answer all letters. My address is 6130 Beech Grove Drive, 46151.

Harry H. Gould, Jr.
Martinsville, IN

- I am a handicapped free-lance writer. I purchased my CoCo for word processing but enjoy using it in other ways for recreation. I have a 64K ECB system with disk drives and would like to correspond with other CoCo users. My address is P.O. Box 186, 67567.

Marilyn Phemister
Pawnee Rock, KS

- I would enjoy having some pen pals. I own a CoCo 2, disk drive, cassette recorder, modem and a DMP-130 printer. My address is P.O. Box 873, 71023.

Tommy McClure
Doyline, LA

- I would like to know if there are any serious 11-year-old CoCo users out there besides me. If you avidly program on the CoCo, I'd like to hear from you. Write me at 217 Haggetts Pond Road, 01810.

Brandon Rhodes
Andover, MA

- I would like to hear from all teenagers who use CoCos. I am 16 years old and don't know anyone in my area that is an avid CoCoer. Send a letter and include your age. Also, send a quarter or an SASE so I can write back. Write me at 19 Crowley Street, 14772.

John F. Plumb
Randolph, NY

- I would like to have some pen pals. I have a 64K CoCo 2, tape drive, touch pad and a DMP-110 printer. I'm especially interested in pen pals with a touch pad and/or a DMP-110. My address is 741 Alicia Walk, Apt. E, 44306.

Keith Selbee
Akron, OH

- If anyone is interested in having a pen pal in Argentina please write me. My address is as follows:

Luis Blando
Independencia 189
San Rafeal
Mendoza, Argentina 5600

- I'm looking for pen pals and would like to exchange letters — especially with *CoCo Max* artists. Also, anyone who has written a Hi-Res (`PMODE4`) screen dump for the DMP-105 printer please write me.

Fabio Luis De Paoli
Rau Des Ferreira Franca
N #40
APTO-153 C
Sao Paulo, Brazil 05446

- I would like a pen pal in any state of the U.S.A. I have a 64K CoCo 2 (tape system). I am 14 years old.

Craig Anderson
16 Lilliput Street
Broadmeadows 3047
Melbourne, Victoria, Australia

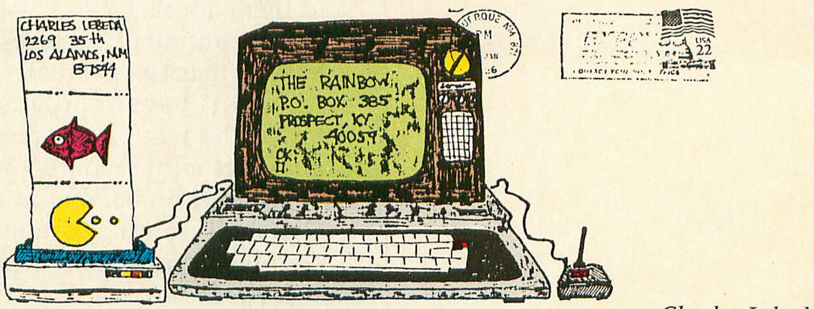
- I don't know many users of a Tandy Color Computer in my country. If you are a CoCo user and live in Belgium or the Netherlands, please write to me.

C. Nottebaert
HOGE WEG 156
Over Boelare, Belgium 9500

THE RAINBOW welcomes letters to the editors. Mail should be addressed to: Letters to Rainbow, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. Letters should include the writer's full name and address. Letters may be edited for purposes of clarity or space.

Letters to the editors may also be sent to us through the MAIL section of our Delphi CoCo SIG. From the CoCo SIG> prompt, pick MAIL, then type `SEND` and address to: `EDITORS`. Be sure to include your complete name and address.

ARTS AND LETTERS



Envelope of the Month

Charles Lebeda
Los Alamos, NM

PRINT#-2,

Well, here it is. Our Fifth Anniversary Issue. We're bursting with pride to have served the CoCo Community for the past half-decade, and we look forward to continuing that service.

How come? Because I happen to believe the Color Computer is a classic that will endure. Even if there were no new CoCo on the horizon (and believe me, as best I can tell, there *is*), the original CoCo and CoCo 2 are the best single pieces of hardware computerdom has brought us.

Back when I was just a youngster, my father worked for Remington Rand and sold UNIVAC computers. In those days they were called "electronic brains" and took up a whole floor of a building. That floor, by the way, was usually a basement, because the old computers needed huge amounts of cool air to keep all the vacuum tubes from blowing. The basement locations gave the cooling a head start.

I used to sit at the dinner table with Mom and Dad and a couple of friends and listen to my dad talk about electronic brains. Why, these wonderful machines were able to do all sorts of calculations, could keep track of things like driver's license numbers (as long as you had lots of punched cards for storage) and even print out things on paper!

Dad didn't know much about how to run a computer, but he sure knew how to sell them. He put in the first "computerized" state driver's license system and one of the first insurance company computer systems. When the insurance company outgrew its first computer, he arranged for them to give it to the University of Alabama School of Business — and then sold them another.

What continually amazes me, though, is that one of those early, giant UNIVAC machines actually had less power than my first Color Computer. And I didn't have to program it with punch cards, either. My point is that what we thought of as a revolution with the introduction of the electronic brain is actually becoming a revolution today — placing electronic brains in everyone's home, and at an affordable cost.

One tends to wax nostalgic on the eve of an anniversary. And five years is certainly a milestone. Not too many computer magazines have made it that long. I think the fact that THE RAINBOW is strong and healthy says a lot for the CoCo Community, the Color Computer and the folks at Tandy who made (and continue to make) it happen.

Telewriter-64™

the Color Computer Word Processor

- **3 display formats: 51/64/85 columns × 24 lines**
- **True lower case characters**
- **User-friendly full-screen editor**
- **Right justification**
- **Easy hyphenation**
- **Drives any printer**
- **Embedded format and control codes**
- **Runs in 16K, 32K, or 64K**
- **Menu-driven disk and cassette I/O**
- **No hardware modifications required**

THE ORIGINAL

Simply stated, Telewriter is the most powerful word processor you can buy for the TRS-80 Color Computer. The original Telewriter has received rave reviews in every major Color Computer and TRS-80 magazine, as well as enthusiastic praise from thousands of satisfied owners. And rightly so.

The standard Color Computer display of 32 characters by 16 lines without lower case is simply inadequate for serious word processing. The checkerboard letters and tiny lines give you no feel for how your writing looks or reads. Telewriter gives the Color Computer a 51 column by 24 line screen display with *true lower case characters*. So a Telewriter screen looks like a printed page, with a good chunk of text on screen at one time. In fact, more on screen text than you'd get with Apple II, Atari, TI, Vic or TRS-80 Model III.

On top of that, the sophisticated Telewriter full-screen editor is so simple to use, it makes writing fun. With single-letter mnemonic commands, and menu-driven I/O and formatting, Telewriter surpasses all others for user friendliness and pure power.

Telewriter's chain printing feature means that the size of your text is never limited by the amount of memory you have, and Telewriter's advanced cassette handler gives you a powerful word processor without the major additional cost of a disk.

> *...one of the best programs for the Color Computer I have seen...*
> — Color Computer News, Jan. 1982

TELEWRITER-64

But now we've added more power to Telewriter. Not just bells and whistles, but major features that give you total control over your writing. We call this new supercharged version Telewriter-64. For two reasons.

64K COMPATIBLE

Telewriter-64 runs fully in any Color Computer — 16K, 32K, or 64K, with or without Extended Basic, with disk or cassette or both. It automatically configures itself to take optimum advantage of all available memory. That means that when you upgrade your memory, the Telewriter-64 text buffer grows accordingly. In a 64K cassette based system, for example, you get about 40K of memory to store text. So you don't need disk or FLEX to put all your 64K to work immediately.

64 COLUMNS (AND 85!)

Besides the original 51 column screen, Telewriter-64 now gives you 2 additional high-density displays: 64 × 24 and 85 × 24!! Both high density modes provide all the standard Telewriter editing capabilities, and you can switch instantly to any of the 3 formats with a single control key command.

The 51 × 24 display is clear and crisp on the screen. The two high density modes are more crowded and less easily readable, but they are perfect for showing you the exact layout of your printed page, *all on the screen at one time*. Compare this with cumbersome "windows" that show you only fragments at a time and don't even allow editing.

RIGHT JUSTIFICATION & HYPHENATION

One outstanding advantage of the full-width screen display is that you can now set the screen width to match the width of your printed page, so that "what you see is what you get." This makes exact alignment of columns possible and it makes hyphenation simple.

Since short lines are the reason for the large spaces often found in standard right justified text, and since hyphenation is the most effective way to eliminate short lines, Telewriter-64 can now promise you some of the best looking right justification you can get on the Color Computer.

FEATURES & SPECIFICATIONS:

Printing and formatting: Drives any printer (LPVII/VIII, DMP-100/200, Epson, Okidata, Centronics, NEC, C. Itoh, Smith-Corona, Terminet, etc).

Embedded control codes give full dynamic access to intelligent printer features like: underlining, subscript, superscript, variable font and type size, dot-graphics, etc.

Dynamic (embedded) format controls for: top, bottom, and left margins; line length, lines per page, line spacing, new page, change page numbering, conditional new page, enable/disable justification.

Menu-driven control of these parameters, as well as: pause at page bottom, page numbering, baud rate (so you can run your printer at top speed), and Epson font. "Typewriter" feature sends typed lines directly to your printer, and Direct mode sends control codes right from the keyboard. Special Epson driver simplifies use with MX-80.

Supports single and multi-line headers and automatic centering. Print or save all or any section of the text buffer. Chain print any number of files from cassette or disk.

RAINBOW
CERTIFICATION
SEAL

File and I/O Features: ASCII format files — create and edit BASIC, Assembly, Pascal, and C programs, Smart Terminal files (for uploading or downloading), even text files from other word processors. Compatible with spelling checkers (like Spell 'n Fix).

Cassette verify command for sure saves. Cassette auto-retry means you type a load command only once no matter where you are in the tape.

Read in, save, partial save, and append files with disk and/or cassette. For disk: print directory with free space to screen or printer, kill and rename files, set default drive. Easily customized to the number of drives in the system.

Editing features: Fast, full-screen editor with wordwrap, block copy, block move, block delete, line delete, global search and replace (or delete), wild card search, fast auto-repeat cursor, fast scrolling, cursor up, down, right, left, begin line, end line, top of text, bottom of text; page forward, page backward, align text, tabs, choice of buff or green background, complete error protection, line counter, word counter, space left, current file name, default drive in effect, set line length on screen.

Insert or delete text anywhere on the screen without changing "modes." This fast "free-form" editor provides maximum ease of use. Everything you do appears immediately on the screen in front of you. Commands require only a single key or a single key plus CLEAR.

> *...truly a state of the art word processor... outstanding in every respect.*
> — The RAINBOW, Jan. 1982

PROFESSIONAL WORD PROCESSING

You can no longer afford to be without the power and efficiency word processing brings to everything you write. The TRS-80 Color Computer is the lowest priced micro with the capability for serious word processing. And only Telewriter-64 fully unleashes that capability.

Telewriter-64 costs $49.95 on cassette, $59.95 on disk, and comes complete with over 70 pages of well-written documentation. (The step-by-step tutorial will have your writing with Telewriter-64 in a matter of minutes.)

To order, send check or money order to:

Cognitec
704 Nob Street
Del Mar, CA 92014

Or check your local software store. If you have questions, or would like to order by Visa or Mastercard, call us at (619) 755-1258 (weekdays, 8AM-4PM PST). Dealer inquiries invited. (Add $2 for shipping. Californians add 6% state tax.)

Available at
Radio Shack stores
via express order
catalogue #90-0253
90-0254

Apple II is a trademark of Apple Computer, Inc.; Atari is a trademark of Atari, Inc.; TRS-80 is a trademark of Tandy Corp; MX-80 is a trademark of Epson America, Inc.

We started out in a spare bedroom of my house. I shared the room with my two girls, who used it to watch TV. I guess I had something like 15 square feet of my very own for THE RAINBOW back then. Now we've got some 17,000 square feet on three floors of the Falsoft Building.

I was, of course, the first employee, but Pat Hirsch was the first paid employee (I worked for free). We're both still here — along with 73 or so others.

I know that many of you wonder what all of us look like and what "the *house* that RAINBOW built" looks like, too. So part of our special Fifth Anniversary edition is an artistic look at most of us on this month's cover. Inside, you'll see our building and many members of our staff. Thank you all so much for helping us get here.

Our special treat is inside — a CoCo Cat iron-on created especially for the occasion by our resident CCCC (CoCo Cat Creator) and art director, Jerry McKiernan. You'll also note that we're planning on running copies of the best CoCo Cat color renditions in future issues — our way to help carry our Fifth Anniversary celebration throughout the year.

It is really interesting how CoCo Cat has captured the spirit of the CoCo and THE RAINBOW. Jim Reed wanted me to buy a CoCo Cat costume and have someone walk around at RAINBOWfest in it — like those animal mascots sports teams have. I'm sorry, we couldn't find anyone willing to wear the thing.

One of our surprises is yet to come, but I am sure it will be greeted with cheer by all. Sometime in the next couple of months, we will begin to wrap all subscription issues of THE RAINBOW in brown paper to protect them from damage in the mail. I'd say this is the most requested item in our files. We've finally been able to put it together. I know that handling of the magazine by the Postal Service has been a problem for many of you. I think that now we'll get it solved.

I am breaking with tradition in not thanking a long list of people for their help, guidance, support and encouragement in the past year. To be very honest, the list is just too long and there is always the chance someone will be left out. In putting together the list a year ago, we caught several omissions at various stages that would have been very bad had they not been included.

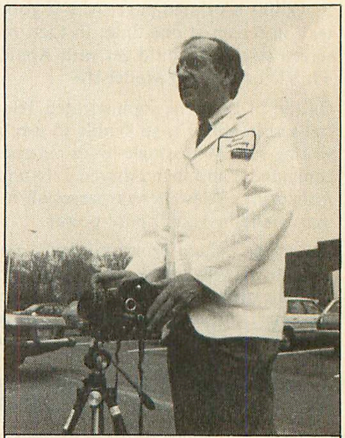
But there is one person who is, indeed, so important it would be impossible to leave them out — and that person is you. Without *your* kindness, support, helpfulness, enthusiasm and dedication to the Color Computer and the CoCo Community, there would be no CoCo Community and no RAINBOW either.

To paraphrase Tiny Tim, "Thank you, every one!" We're here, happy and healthy, supporting the grandest little computer in the world and proud you let us be part of that world.

So, perhaps it is fitting that we do not say Happy Anniversary to us, but Happy Anniversary to you! After all, it's your Community, and we're proud to be a part of it.

— Lonnie Falk

"We're here, happy and healthy, supporting the grandest little computer in the world . . ."



With every one of us in the picture appearing on Page 44, we needed someone to snap the shutter. Our local pharmacist, Thomas Bond, Jr., came over and filled the bill with a professional touch.

ARK ROYAL GAMES

NEW!!!!

BATTLE HYMN

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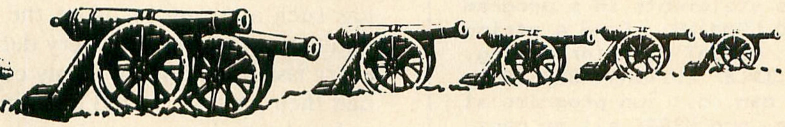
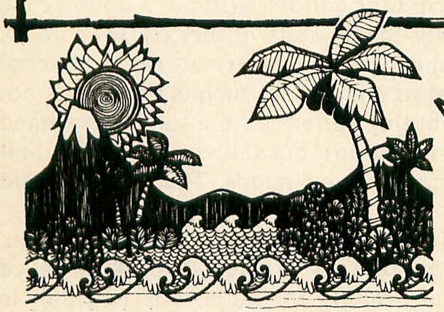
BATTLE HYMN The Battle of Gettysburg. Command Lee's army of 39 Divisions, including Stuart's cavalry brigades, and infantry division under the command of such famous names as Johnson, Heth, McLaws, Hood, Early and Pickett. Try to do what the real Confederates couldn't: destroy Mead's army at Gettysburg. New movement and turn structure; form lines, rally, limber and unlimber cannon, backstep, and do your best to outflank the Union line at Culp's Hill, Devil's Den or Big Round top. Historical, with an Ark Royal touch. Available also on the IBM PC (Tandy 1000). Graphics are hi res; game is machine language throughout. **$29.00**





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BUILDING JULY'S RAINBOW

Still Beginners, Five Times Over

A generation or so ago, when I was a member of the sliding board and swings crowd on the playground at school, I occasionally was taunted about how my mother was "just a third-grade teacher," as if somehow, by now, she should have reached the ninth grade or so, at least. It was a challenge I took up with relish. I'd prop my fists on my hips and launch into them with a "Ha, ha, ha. That's all you know," and lecture on how it took a lot of specialized training to be an elementary school teacher.

A few years later, Mom became a first-grade teacher and remained one for 20-some years until her retirement. According to my by-then ingrained logic, if being a primary instructor was so important, then teaching the first grade must be the zenith of the teaching profession — I still feel that way.

Getting off on the right foot is so very important; that's why THE RAINBOW has such a strong focus on the beginner. While we are celebrating our fifth anniversary, we make a very deliberate effort to keep the new user in mind in every issue. We remain firmly committed to this precept, even though if many had their way, we would be doing only "fifth year" material at this juncture.

Just look at our expert panel of contributing editors. Without a doubt, each of them could be delving into some really "heavy stuff" if they chose to do so. But, instead, all of them devote the major portion of every article to material selected with the beginner (in that area) in mind. That such is the case is not a matter of editorial decree (our contributing editors have a totally free hand in their selection of subject matter and direction), but shows a consensus that we must always keep the novice uppermost in our minds. That is easier said than done.

All too often, authors evolve according to their interests: that is, early on, they write BASIC programs, but as time passes they "graduate" to the so-called "low-level" languages, as if the ultimate calling for authors is to think in assembly language, or even straight Hex code. That might be a logical course for professional programmers, but for writers it is a primrose path. THE RAINBOW is a teaching environment and the majority of our readers will always be beginners.

Most recently, my concern is that the lure of the much-rumored "new CoCo" will be irresistible to our RAINBOW writers and that "everyone who is anyone" will be racing to support the new machine. Well, folks, the "user base" for a long time to come is going to be those who have the present machine, and our readership's need, for both the short and the medium term, is mainly going to be for material to support the present Color Computer. Our advertisers as well as contributors would do well to keep this in mind.

Lest our veteran readers become worried that we won't keep up with their changing needs, too, let me relate a story of my father's. While school superintendent, Dad would sometimes visit in the classroom as an observer. On one such visit, he recognized a notably bigger boy who was repeating the first grade. "John," he asked the boy, "how do you like school?" The immediate response: "I like school OK, but if they don't get me out of this damn rabbit book, I'm going to quit."

So, even though THE RAINBOW is now 5 years old, we want to reach those who've had their CoCo for only five months, or five days. And, though we all want to see the new generation of CoCo, we are not going to abandon the machine we have right now. And, to remain true to those who've been with us a long time, we'll continue to provide both a full mix of subjects and the very latest information on our Color Computer. THE RAINBOW's no rabbit book, but rather a dynamic, evolving monthly magazine with something for everyone in the CoCo Community. We believe it's based on an educational philosophy you'll want to subscribe to.

— Jim Reed

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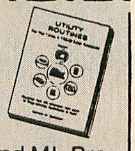

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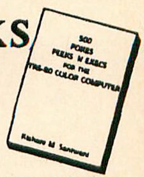

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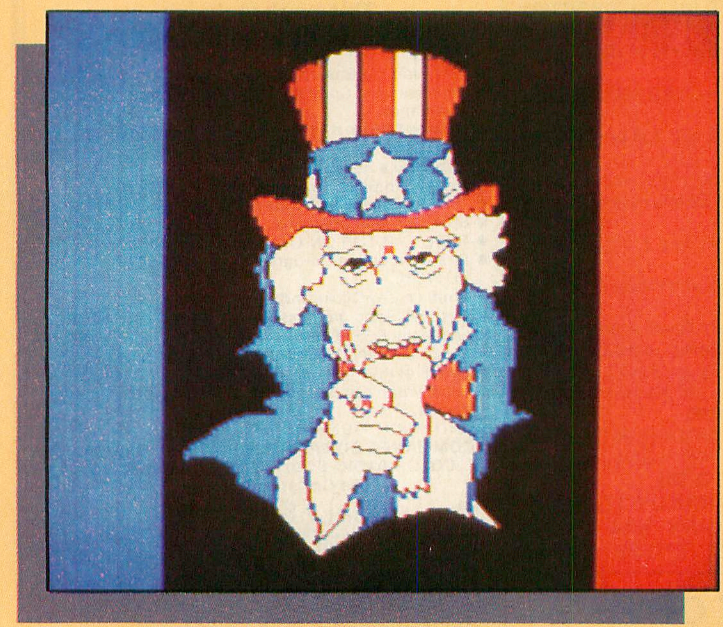
The CoCo Gallery

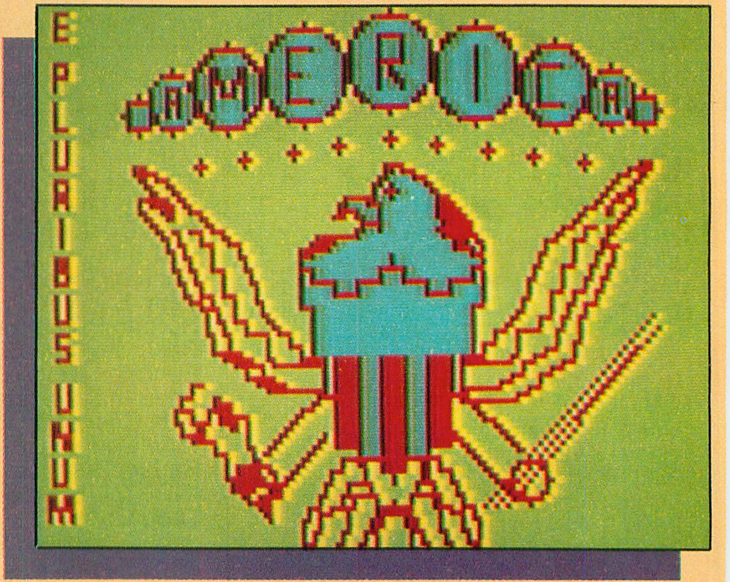


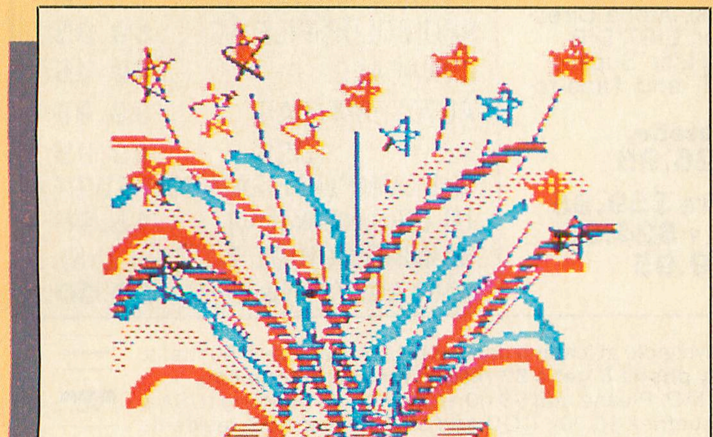
1st PRIZE

Edward B. Mallalieu
Uncle Sam
In celebration of America's spirit of independence, Edward gifts the gallery with this portrait of a stern but beloved gentleman. Created with BASIC, this well-known persona takes first prize.

2nd PRIZE

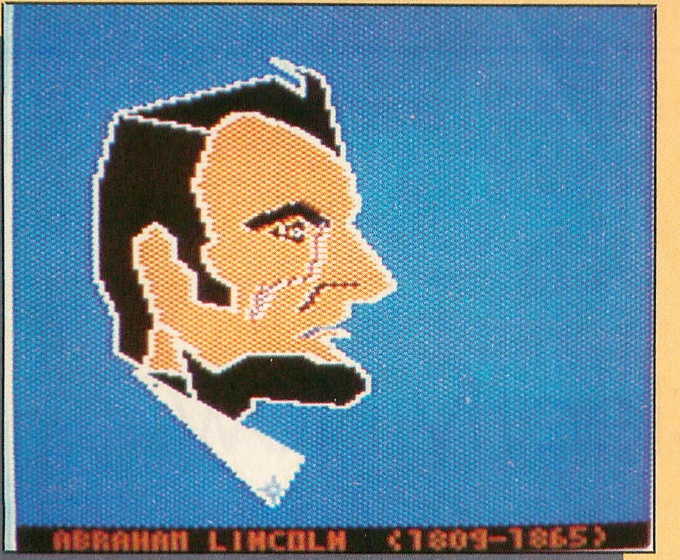
Don Duquet
America
Our second prize goes to Don for his work depicting America's national symbol and motto. Don lives in Winslow, Maine, and used BASIC for this proud clarion of independence.





3rd PRIZE

George Aloia
4th of July
George lives in Margate, Florida, and captures a CoCo celebrating America's Independence Day. George used *CoCo Max* for this kinetic keyboard.

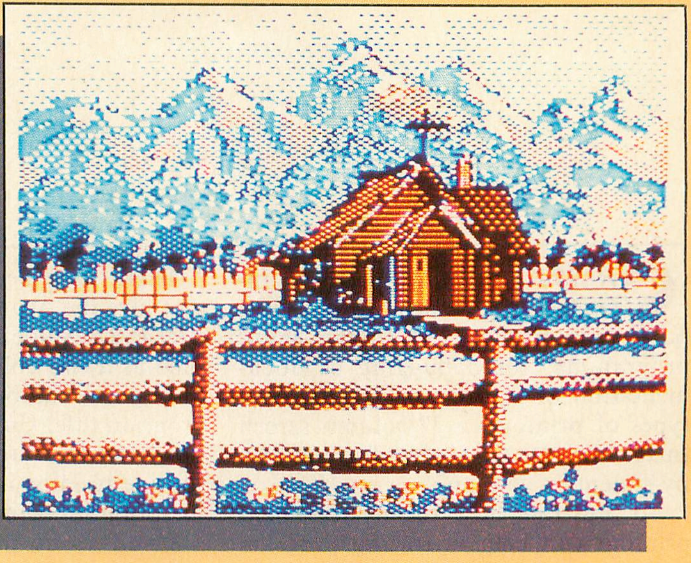


HONORABLE MENTION

Tim Laun
Abraham Lincoln
Using *Micro Illustrator*, Tim creates a caricature of one of America's most distinguished presidents. Tim lives in Kiel, Wisconsin.

Michael Chu
Chapel
Bringing our gallery to a conclusion, Michael offers patrons a serene and graceful view of a pastoral setting. Michael lives in Montclair, California, and used *CoCo Max II* for this work.

HONORABLE MENTION



SHOWCASE YOUR BEST!

You are invited to nominate original work for inclusion in upcoming showings of "CoCo Gallery." Share your creations with the CoCo Community!

Be sure to send a cover letter with your name, address and phone number, detailing how you created your picture (what programs you used, etc.) and how to display it. Also, please include a few facts about yourself.

Don't send us anything owned by someone else; this means no game screens, digitized images from TV programs or material that's already been submitted elsewhere.

We will award a first prize of $25, a second prize of $15 and a third prize of $10. Honorable mentions will also be given.

Jody Doyle, Curator

Send your entry on either tape or disk to:
CoCo Gallery
THE RAINBOW
P.O. Box 385
Prospect, KY 40059
Attn: Jody Doyle

PROGRAMMING UTILITY **16K ECB**

A powerful utility for more readable listings

I Can See Clearly Now

By Lynn Sundberg

SRLIST is a utility program intended to give a more powerful version of `LLIST` to the BASIC programmer for debugging or documentation of a program. It gives two types of printout: a 32-column screen image like THE RAINBOW's format, or a by-statement column.

To illustrate how the by-statement printout can help in tracing program logic, I have taken the liberty of running Harris Allen's one-liner contest winner (RAINBOW, December 1984, Page 212) through *SRLIST* to produce the following printout:

```
0 IFA<>0THENFORA=1TO4:
    FORB=0TO1:
    X=X+A(A):
    Y=Y+A(A+1):
    IFPPOINT(X,Y)=5THENPRINTC;"TURNS
    ":
    ELSEPSET(X,Y):
    IFINKEY$=""THENB=0:
    NEXT:
    ELSEC=C+1:
    NEXT:
    NEXT:
    GOTO0:
    ELSEIFINKEY$=""THENPRINT"CRAM/PR
    ESS KEY":
    GOTO0
  ELSEPMODE4,1:
    PCLS:
    SCREEN1,1:
    A(2)=1:
    A(4)=-1:
    A=1:
    GOTO0
```

Lynn Sundberg, a senior chief in the U.S. Navy, lives in San Diego, California. He enjoys altering programs to suit his needs.

There have been simpler programs that give the two formats, but much of *SRLIST*'s value comes from niceties such as a two columns per page printout, page numbering, run date and program title. Unlike most pretty print programs that are a machine language routine residing in memory along with the program being printed, *SRLIST* is a stand-alone program that uses a program saved in ASCII format (`SAVE "NAME",A`) as an input file.

To make *SRLIST* compatible with as many CoCo configurations as possible, hardware requirements and hardware control coding have been kept to a minimum. The program works on a 16K CoCo, yet Line 5 uses all available standard BASIC memory in a 64K machine. It does require ECB and an 80-column printer.

As written, the program is for a disk system. For cassette systems, make the following modifications: change Line 110 to: `PRINT@416,"SET CASSETTE TO START OF ";X$:INPUT Z$:PRINT@416,B$:PRINT`; change the two `#1`s in Line 115 to `#-1`; change the `(1)` in Line 125 to `(-1)`; change the `#1` in Line 130 to `#-1`.

Printer codes are used in Line 10 to set printer tabs to 1 and 40, while the code in Line 350 positions the printer at the 40th space. Line 360 contains a code for "top of form." You may have to change these codes for your printer. Or remove all printer codes with the following changes:

1) Delete Line 10
2) Replace Line 355 with

```
PRINT#-2,LEFT$(L$(Y)+SS$,39)
;:L$(Y)=B$:PRINT#-2,L$(Y+Z
+1):L$(Y+Z+1)=B$:NEXT
```

3) The FOR statement in Line 360 should read

```
FOR X-=0 TO ?
```

where the question mark is replaced with whatever number gets you to the start position of the next page. A little experimentation will be required to find this number, but it will be a small number.

Removing the printer codes causes the program to run slower because it fills memory with old print lines and stops to clean itself every page or so.

To use *SRLIST*, save the program to be printed in ASCII format and run *SRLIST*. A screen displays reminding you the program being printed out must be in ASCII format. The screen then clears and requests input for program parameters.

It asks for the date and the program name. If the program uses the BAS default extension, *SRLIST* automatically adds it to the program name.

Next it requests type of run, either by-statement columns or 32-character columns with a default to the by-statement run. The next parameter is paper type. Continuous paper is the default value and once started, the program runs to completion. If the single-sheet option is chosen, the computer stops and prompts you to enter a new sheet of paper for each page.

Following the program parameters, you are asked for three sub-parameters that can be changed after each run made on the same program. The first sub-parameter is the number of the first line to be printed. The second is the the end line. If the end line is less than the first line, the program defaults to 9999. Line numbers higher than 9999 can be processed, but in the printout only the four right-hand digits are printed. The third is the starting page number.

These sub-parameters allow printing of a portion of a program, or reprinting a program section while keeping page continuity.

(Questions about this program may be directed to the author at 3086 Minuteman Street, San Diego, CA 92124. Please enclose an SASE when writing.) ☐

The listing: SRLIST

```
5 CLEAR50:CLEAR MEM-1000
10 PRINT#-2,CHR$(27);"D";CHR$(1)
;CHR$(40);CHR$(0)
15 WC$="WORKING":WS$="working":S
P=1
20 B$="":S$=" ":S5$="     ":SS$=
STRING$(41," "):E$="ELSE":C$=":"
:I$="IF":R$="'":RR$="REM":Q$=CHR
$(34)
25 L=-1:DIM L$(103)
30 'START
35 CLS:PRINT@33,"SRLIST BY L.SUN
DBERG":PRINT@97,"S-LIST GIVES A
BY STATEMENT":PRINT@131,"PRINTOU
T"
40 PRINT@193,"R-LIST GIVES A 32
CHARACTER":PRINT@227,"PRINTOUT"
45 PRINT@321,"SRLIST IS A STAND
ALONE":PRINT@353,"PROGRAM BUT DO
ES REQUIRE THAT":PRINT@385,"THE
PROGRAM BEING LISTED":PRINT@417,
"BE IN askii FORMAT"
50 FORX=0TO1500:NEXT
55 CLS:PRINT@105,"DATE ";:INPUT
DA$:PRINT@110,DA$:PRINT@129,"PRO
GRAM NAME ";:INPUT PN$:PRINT@142
,PN$
60 PRINT@165,"TYPE RUN  S-STATEM
ENT":PRINT@207,"R-32CHARACTER":I
NPUTX$
65 PRINT@207,B$:PRINT:IFX$="R" T
HENT=1:PRINT@175,"R-32CHARACTER"
70 PRINT@195,"TYPE PAPER  C=CONT
INUOUS":PRINT@239,"S-SINGLE SHEE
T":INPUTX$
75 IFX$="S" THEN PRINT@207,"S-SI
NGLE SHEET":TP=1
80 PRINT@224,B$:PRINT:PRINT
85 'RUN LOOP LIMITS
90 PRINT@291,"START LINE ";:INPU
TSL:PRINT@302,SL
95 PRINT@325,"END LINE ";:INPUTX
:IFX>SL THEN EL=X ELSE EL=9999
100 PRINT@334,EL:PRINT@355,"STAR
T PAGE ";:INPUTX:IFX>0THEN SP=X
105 PRINT@366,SP:X$=PN$
110 X=INSTR(X$,"."):Y=INSTR(X$,"
/"):IFX=0AND Y=0THEN X$=X$+".BAS
"
115 OPEN"I",#1,X$:INPUT#1,X$
120 ' READ LOOP
125 GOSUB320:IFEOF(1) THEN380
130 LINEINPUT#1,X$:X=INSTR(X$,S$
):A=VAL(LEFT$(X$,X))
135 IFA<SL THEN125ELSE IFA>EL TH
EN380
140 IFT=0THEN175
145 ' PROCESS 32 CHAR LINE
150 L=L+1:IFL>103THEN GOSUB335
155 IFLEN(X$)>32THEN165
160 L$(L)=X$:GOTO125
165 L$(L)=LEFT$(X$,32):X$=MID$(X
$,33):GOSUB320:GOTO150
170 ' PROCESS BY STATEMENT
175 P$=RIGHT$(S5$+LEFT$(X$,X),5)
:X$=MID$(X$,X+1):XX=1:A=0
180 I=INSTR(XX,X$,I$):IFI>0AND I
<3OR A=1 THEN 245
185 C=INSTR(XX,X$,C$):IFC>0THEN
195
190 P$=P$+X$:GOSUB405:GOTO125
195 Q=INSTR(XX,X$,Q$):R=INSTR(XX
,X$,R$):RR=INSTR(XX,X$,RR$):IFRR
>0AND R>RR THENR=RR
200 IFQ>0THEN230
205 IFR>0THEN225
210 P$=P$+LEFT$(X$,C):GOSUB405:P
$=S5$:IFA=1THEN P$=P$+S$+S$
215 XX=1:IFC=LEN(X$) THEN125
220 X$=MID$(X$,C+1):GOTO180
225 IFR<C THEN190ELSE210
230 IFQ>R AND R>0THEN225
235 IFQ>C THEN210
240 XX=INSTR(Q+1,X$,Q$)+1:IFXX=1
OR XX=LEN(X$)+1 THEN190ELSE185
245 A=1:E=INSTR(XX+1,X$,E$):IFE=
0THEN185
250 C=INSTR(XX,X$,C$):Q=INSTR(XX
,X$,Q$):R=INSTR(XX,X$,R$):RR=INS
TR(XX,X$,RR$):IFRR>0AND R>RR THE
N R=RR
255 IFC>0 AND C<E THEN 200
260 IFQ>0THEN300
265 IFR>0AND R<E THEN 225
```

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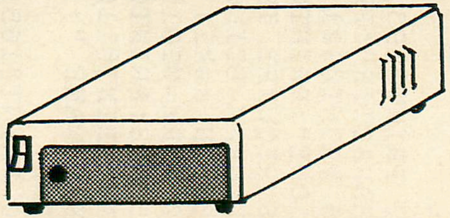

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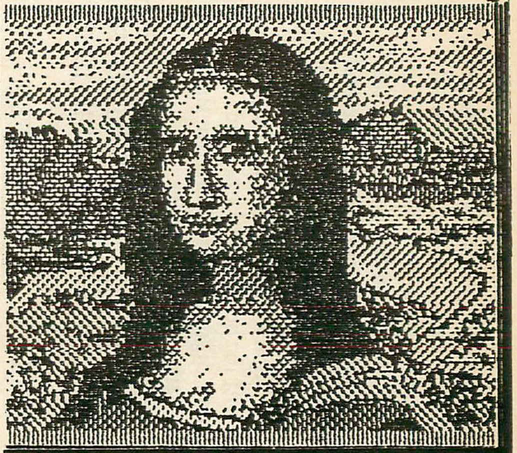

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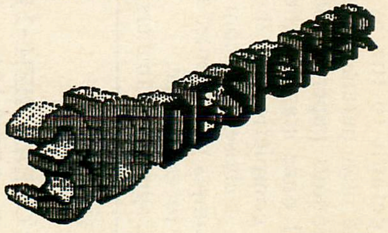

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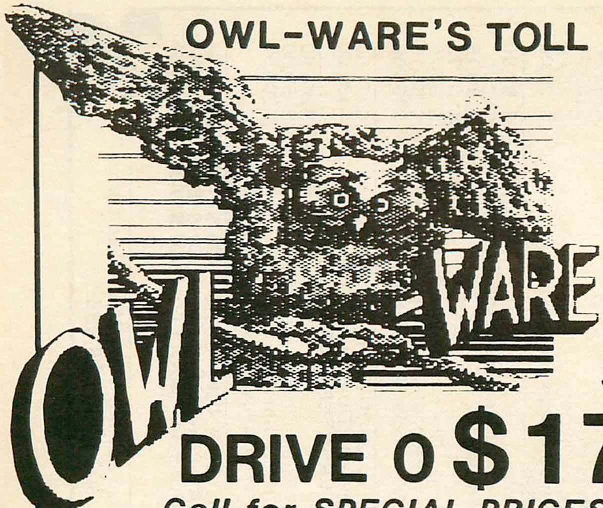

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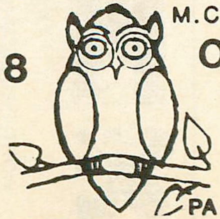

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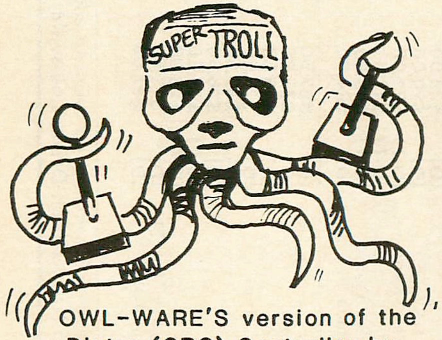

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```
270 C=INSTR(XX,X$,C$)
275 IFC=0OR C>E THEN290
280 P$=P$+LEFT$(X$,C):GOSUB405
285 P$=S5$+S$+S$:X$=MID$(X$,C+1)
:XX=1:GOTO245
290 P$=P$+LEFT$(X$,E-1):GOSUB405
295 P$=S5$:X$=MID$(X$,E):XX=1:GO
TO245
300 IFR>0AND R<Q THEN265
305 IFQ>E THEN270
310 XX=INSTR(Q+1,X$,Q$)+1:E=INST
R(XX,X$,E$):IFE=0THEN185ELSE250
315 ' WORKING LOOP
320 IFW=0THEN W=1:PRINT@460,WC$
ELSE W=0:PRINT@460,WS$
325 RETURN
330 ' PRINT PAGE LOOP
335 PRINT@448,B$;:IFTP=1THEN INP
UT"INSERT PAPER - <ENTER>";Y$ EL
SE PRINT
340 Y$=LEFT$(PN$+SS$,40)+RIGHT$(
SS$+DA$+" PRINTOUT",40):PRINT#-2
,Y$:PRINT#-2:PRINT#-2
345 IFL>103THEN Z=51ELSE Z=L/2
350 FORY=0TO Z
355 PRINT#-2,L$(Y);:L$(Y)=B$:PRI
NT#-2,CHR$(9);L$(Y+Z+1):L$(Y+Z+1
)=B$:NEXT
360 FORZ=Y TO53:PRINT#-2:NEXT:PR
INT#-2,RIGHT$(SS$+SS$+"PAGE"+STR
$(SP),80):SP=SP+1:L=0
365 PRINT@448,B$:PRINT#-2,CHR$(1
2)
370 RETURN
375 ' END ROUTINE
380 CLOSE:GOSUB335
385 PRINT@448,"ANOTHER RUN";:INP
UT" Y/N";X$
390 IFX$="Y" THEN FORX=256 TO 41
6 STEP32:PRINT@X,B$:NEXT:L=-1:GO
TO90
395 CLEAR200:CLS:END
400 ' STORE STATEMENT LINE
405 L=L+1:IFL>103THEN GOSUB335
410 GOSUB320:P=LEN(P$):IFP>39THE
N420
415 L$(L)=P$:RETURN
420 L$(L)=LEFT$(P$,39):P$=S5$+MI
D$(P$,40):IFA=1THEN P$=S$+S$+P$
425 GOTO405
```

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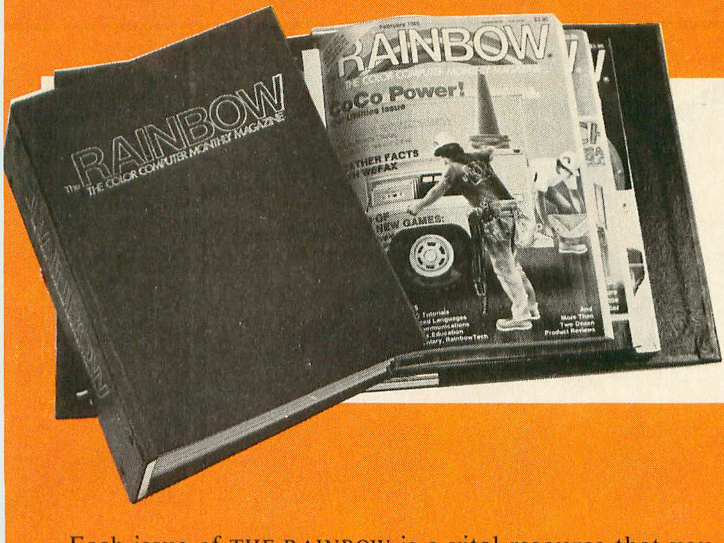

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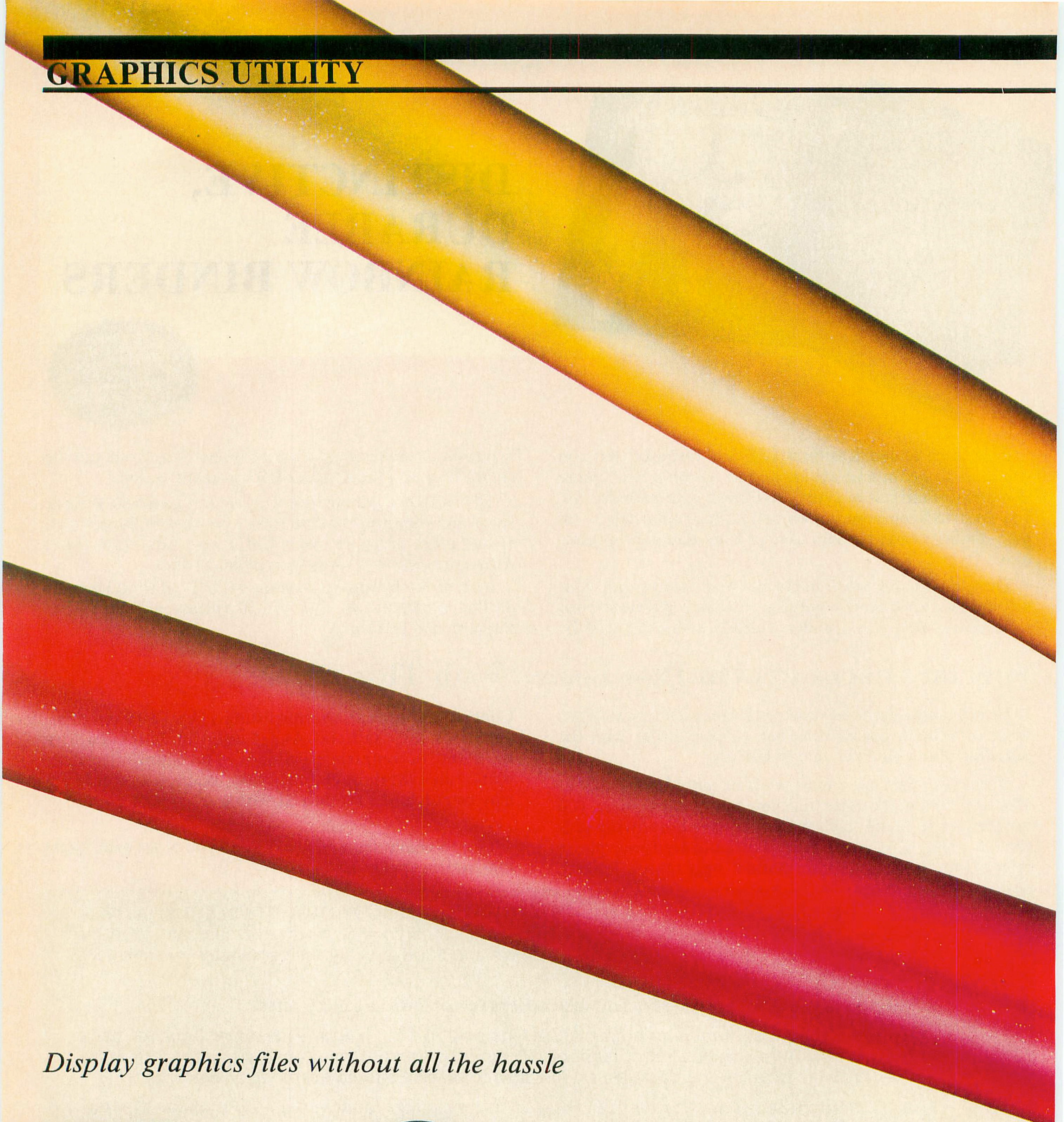


Display graphics files without all the hassle

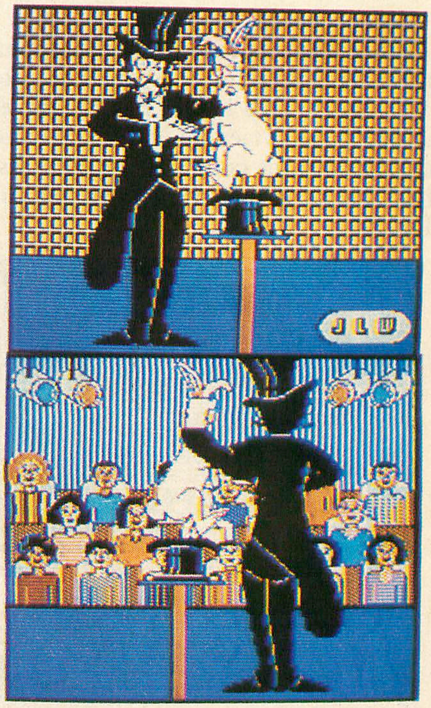
The Great Picture Show

32K
Disk

By Jeff White

As a child I always wanted to draw pictures, but my best efforts looked worse than a 2-year-old's finger painting. In my mind I could see the pictures I wanted to draw, but could never get my hands to transfer them to paper.

Then I got a Color Computer! What a great tool for a would-be artist. It was the answer to my problem. Of course I have to edit each picture over and over, but at least I get my mental pictures on the screen for others to see and enjoy.



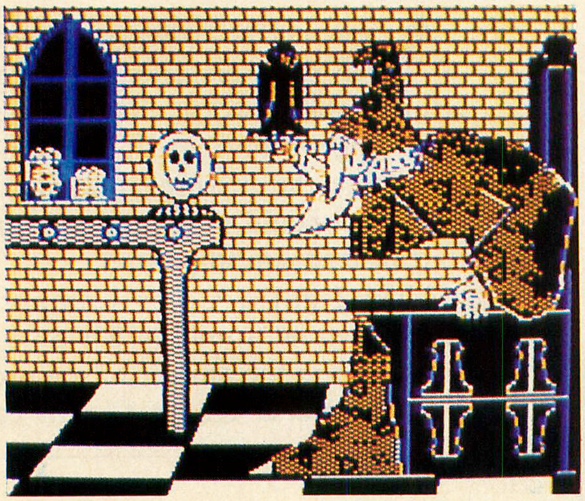
The above is a CoCo Max *file. Use the up- and down-arrow keys to scroll the pages.*

RAINBOW ON TAPE filename: `MAGICIAN`

I try to collect as many pictures as

Jeff White is a self-taught programmer and has had a CoCo for three years. He is president of the Carrollwood CoCo Club and owner of Merlin's Software. Jeff lives in Tampa, Florida.

I can and have 20 disks full of picture files. I enjoy the artistic works of others and use them as inspiration for my own creations. I had a problem when I viewed them, though. It was necessary to load each picture into memory to see it. To help me do this, I wrote *Picture Show.*



RAINBOW ON TAPE filename: `WIZARD`

Picture Show is easy to use. It is menu driven and does practically everything for you. The program starts with a BASIC loader. This loader has the pokes to set the colors. The title page comes up and if the color set is wrong, just press Reset. If the colors are right, press ENTER. The pokes restart the program in memory and allow you to set the colors.

STILL SITTING HERE
AT
3AM

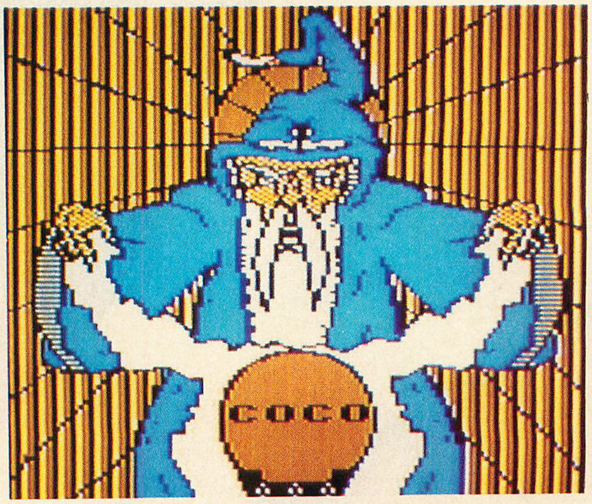
RAINBOW ON TAPE filename: `LATECOCO`

Once the colors are correct, you have the option to read the instructions. You may choose to view the pictures individually or automatically and which drive to read. If you choose to see the pictures individually, it presents a menu of the files on that disk. Enter the number of the file you want to see and press ENTER. The file is then loaded into view. If the file is a *CoCo Max* file, use the up- and down-arrow keys to see both pages. Press ENTER to return to the menu.

If you choose to see the pictures automatically, *Picture Show* loads all the files on the disk and, if they are *CoCo Max* files, scrolls the pages by itself. If you choose automatic, make sure the only BIN files are picture files because the program loads any BIN file on the disk.

If you have any suggestions or comments, please write to me at 1304 Four Seasons Blvd., Tampa, FL 33613.

Editor's Note: To demonstrate *Picture Show*'s operation, four picture files will be included on this month's RAINBOW ON TAPE immediately following the *Picture Show* program listing. When transferring these files to disk, they must be given extensions of BIN, MAX or PIC, followed by the ML Addresses listed on the RAINBOW ON TAPE printed menu. ☐



RAINBOW ON TAPE filename: `MERLIN`

200	26	960	12
360	216	1070	90
510	227	1170	183
660	74	1280	188
810	8	END	37

Editor's Note: To generate the underscore (_) in the following listing, use the SHIFT and up-arrow keys. The backslash (\) is generated by pressing the SHIFT and CLEAR keys.

Listing 1: `LOADER`

```
10 'PICTURE SHOW
20 'BY JEFF WHITE
30 '(C) 1986
40 '1304 FOUR SEASONS BLVD.
50 'TAMPA, FLA. 33613
60 '(813) 971-4451
70 'LOADER PROGRAM WITH AUTO
   RESTART AND PICTURE DATA FOR
   PICTURE SHOW
80 CLS3:PRINT@235,"one moment";
90 POKE1262,32
100 CLEAR3000,&H7F42:GOTO1400
110 'PICTURE DATA
120 S=6:E=&H1D:IF PEEK(&HC000)=&
H44 THEN D=1:S=S+8:E=E+8
130 POKE&H7FFC,S:POKE&H7FFD,0:PO
KE&H7FFE,E:POKE&H7FFF,&HFF
140 FORI=&H7F42 TO&H7FF7:READ H$
:POKE I,VAL("&H"+H$):NEXT
150 DATA EC,8D,0,B8,83,0,1F,ED,8
D,0,AD,A3,8D,0,AB,43,50,5C
```

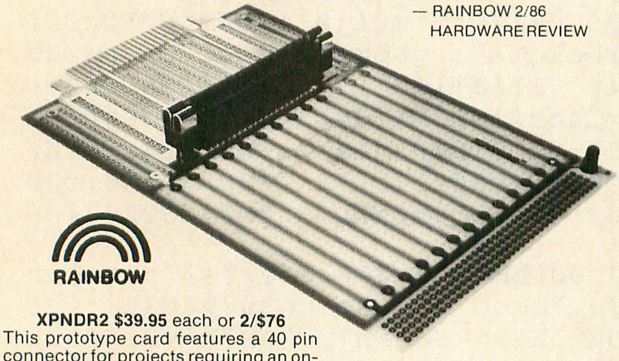
```
160 DATA ED,8D,0,8C,1A,50,7F,FF,
DF,9E,33,30,6,10,8E,80,0,86
170 DATA 8,A7,8C,3A,86,6,A7,8C,3
4,A6,80,80,30,48,48,48,59,6A
180 DATA 8C,29,27,E,6A,8C,25,26,
F4,E7,A0,C6,8,E7,8C,1C,20,EB
190 DATA 86,6,A7,8C,14,A6,80,26,
A,A6,4,81,22,26,C,30,5,A6
200 DATA 80,80,30,48,48,20,D9,0,
0,8E,80,0,10,AE,8C,50,A6
210 DATA 80,A7,8C,47,6F,8C,45,A6
,80,A1,8C,3F,26,F,E6,80,A6,80,A7
220 DATA A4,8D,15,8D,22,5A,26,F7
,20,4,A7,A4,8D,A,8D,17,27,E2,7F
230 DATA FF,DE,1C,AF,39,10,AC,8C
,1E,24,4,31,A8,20,39,31,A9,E8
240 DATA 21,39,6D,8C,F,26,B,10,A
C,8C,E,26,3,6C,8C,4,1A,4,39
250 READZ:EXEC&H7F42
260 GOTO1340
270 DATA1
280 "m?@40?@i3'000?@73'3d10D4004
10O@710D50@4410Cd4PD0000>3@\73Pd
290 ";l'h=2'L>3@\73Pd;l'h=2'L>3@
\73Pd;l'h=2'L>3@\73Pd;l'h=2'L>3@
300 "000?@C3o@80?@io'000?ooo?cal
O01m0AE00jKR85VH'ISIV4001PI645@m
310 "0EAAdI6ATM7@O@4Ad57A'000>kM
^gO^gK]gk]fkMnkM^gO^gK]gk]fkMnkM
320 "^gO^gK]gk]fkMnkM^gO^gK]gk]f
kMnkM0000ooo3gMg3gmoOol?MgL?Ogmo
330 "ooo@80?@io'0001DEm0AED0L7@5
AE0>jk3^0OPN6PiZN06njkk[\>hOSin?
340 "WhN7inm0Cim0KW0000k]fkMnkM^
WC]fK]cjm^iLNcL^WO^gK]gk]fkMnkM^
350 "gO^d:A<g<b<K>c<S5k0';]gk]d0
003oo'aeM@aMKGCo37Ee35e]M?oom0P0
360 "m2?oo?glo?@=oocmo?co0000m0I
E0OkoH0EEEHFhkQ^8ioPHKX1^^^bik;W
370 "XX>JOWijNOWinnO@4n?WPi^3P00
00k]fkMnh=@8nHm0@H6AVHSd001nkM^g
380 "O^gK]gk]fkMnh0N<g=cLcMK@f9L
000^gO^g@000?oo6?Ok?Okg6?1Hmo\mo
390 "_LHoood203d1Ood1Okooood1?kd
4_10oflPm0EWHgl_IflPIfMQn@41o'00
400 "04l001PH@40InGT0D5EE0>jk[SQ
^>Vhkk[_^^njkkR00QhLWIbL71oT10@7
410 "Y^@0>0^00003^gK]gk\4AR4a4QP
HFlTA<2101@nkM^gO^gK]gk]fkMnh019
420 "VKVo?dl9_a002kMnkM0000oooSG
NognegSon=MkoOkGN?ooo@80?@4o'='^
430 ";d^9:2PYbO71'od4_1LQF0'4IWI
fITaLN>3laooooocmo?co00005AD5IFDE
440 "5>7on0EEEE@lk[\0QhNPIR1V8fP
k[S\^^VjJS^7QioWinO@5oWinOW10003
450 "^gK]gk]fkMniM>gM^GC]gk]fkMn
kM^gO^gK]gk]fkMnh5ha<2HK<c<S4ch'
460 "85^gO^g@000?ooookmoOgnooooo
_gmoOkooood203d1?10LN9RH61VH6AXL
470 "'00ml;o0OUQH6ITm0QUI6AVH?T1
0O10003d1UD0oolH0EED0;_XP1SSh05V
480 "HPJPk[[X^H4@LG5alO711LC1O7a
'm0ElT0000>kM^gO^gK]gk]fkMnkM^gO
490 "^gK]gk]fkMnkM^gO^gK]gk]fkMn
kM^gO^gK]gk]fkMnkM0000oom'moO'mo
500 "M'og3gmo3emWOooo@80?ooo'm0o
\;0'?S1'<W2o000ml;oh81'H<;7Shodl
510 "In?clMR<0n0h?10003dleF5PAlE
E@GQY@D1VIV1VH4I0AT5I@FDU15AAO@@
520 "E@000>kM^gO^gK]gk]fkMnkM^gO
^gK]gk]fkMnkM^gO^gK]gk]fkMnkM^gO
530 "^gK]gk]fkMnkM0000oomMcMGIgM
eMol5OGl?Ogd7ooo@80?oool<@Ok6a<C
540 "6o=S<ah006ml;o0<OVI200Qo@7o
hLWInK61Pko0000m0@:0Pl20_@42P8?0
550 "P;d10X23'82m0@:0Pl20_@42P8?
0P;d10X23'82m0@:0Pl20PX:20P03082
560 "m0@:0Pl20_@42P8?0P;d10X23'8
2m0@:0Pl20_@42P8?0000ool4gMgLgMg
570 "Lohae_Mc]MHcooo@80?@4ocPCm0
BF5QH6U^100?@Bo'3o<30bm0bc<?'00?
580 "10003d17X2o'82m0Aj0_120_@4N
P;o0P;d17X2o'82m0Aj0_120_@4NP;o0
590 "P9jNWQh0>3d2Pl0H7Qj0_120_@4
NP;o0P;d17X2o'82m0Aj0_120_@4NP;o
600 "0000ool@moL'mOHGoa3moCgmoAg
ooo@80?@4oaRC51A'L7iPB13P0PKoooo
610 "PcmKFa\Kgm_K6g<30ool0cl=32'
_d2__inOclool0003d17X2o'82NWYjN0
620 "3100;d17X2o'82m0Aj0_120_@4N
P;o0P;d17X2o_@G0?120_@4NP;o0P;d1
630 "7X2o'82m0Aj0_120WYjN7P0h000
0?ookgMkno_gKom_mo_knoO_oood203d
640 "1?18'1G5'L7='LWAiP00ooon0><
e=C4ah@45LGM'l?oo3<d<3?@;?aj4hGh
650 "00?10003d17X2o'82NWYj>P8300
00@61P0<00001PL70'\000Ng]iN0;o00
660 "ljNWQ0m0X0h83n0O@;08020?@4N

03h001hN71'0>000?@4@?@=0?ooo_@5o
670 "okoo_@5ookooo@80?@4oaR;'^9b
>Qh>1R8b>7Sooanln?@4S?R'V8'7033o
680 "o'3c@43d34j>2l\hN?od101PH60
0h000m0A'0?00<0P60@0003Sll^oQgem
690 "_LW_kn?\K2lL000MW2'8=3Pl?0?
@40o@40?P7m0D0A4Cd1002mld00@8000
700 "3ooclgMglgMcOo<7MgL7Mg=ooom
0P0oooo3dl?61a>Af=9D5Q?@63oon68?
710 "eQH61oHflVHO'00ool0o\70c<k>
c<7oc<K6'179c<3b0P?om0'0m0D10000
720 "0H51?0<0002lgmoN^Goono\gah0
0O_ooonOVIXE30=oolo?ooocloco'm0\
730 "?00<30O@B004210P@8420m0D0oo
mom0OoOo@8oo@80?@4oan?Chl?7ho?cl
740 "n?3aooool0cePL3PLS2ClHS'00o
omh6hS8m0C>SPhN?ShNWXk6h7<00?100
750 "008210@8D52Q8Cd1PP000P820Wn
m0@0^7Sh<37'1?[jl_9P00;JT0a<\?3'
```

```
760 "l330m0O''o@9?c'0<33'l?10003
Ph?@4071'0000<3Q6PO@=0?oo7Ve]7Fe
770 "]7_lNKFdMKFdNoood203dl?o0Wk
2iW8k7Tj6aWh30oooh0XmFUPH7Q\K6aY
780 "l00?oo0?ol'<c>c<W3ol?lb<c?c
\clo'00o'000210@83dl03dl08?0P8J6
790 "SXj0__dl@0j0]o2P_@4NP8o0P9j
N_'@:010@6lPho??c3l?loool'023'82
800 "2QXJ6P8O0P8j>SXJ0Ql20PX:0P:
2HaX2m0X0oolgem[Mf]LgocOGf]gJecO
810 "ooo@80?@4ob0?TC0'<S:b\94>02
3oogl0laD50L4=0DTAiP00oolOSlo?C'
820 "l?m0Ho3dm?cln?3aoo00000PXJ0
Wl20_@4NP;o0P;dl7X2o'826QXjNP;o0
830 "P;dl7X2o'82m0Aj0P?d3@0'3o3?
?<3oo'02o'82m0Aj0_l20_@4NP;o0P;d
840 "l7X2o'82m0Aj0Sl20000oomoOoo
oogmoogmooooOgoooo@80?ooooPR3iK
850 "Fa\O6aXH67010oooo68_2hW8j7P
h68S8hN?@Ho'0007YjNP;o0P;dl7X0m'
860 "l?GSP2NP;o0P;dl7X2o'82m0Aj0
_l20_@4NP;o0PlPP83dlP0?7'l0'@92F
870 "]Xj>P;o0P;dl7X2o'8205mlMP7n
0P;dl7X2o'82m0Aj0_l20000oon>gMkO
880 "gmf>ohkMg]oOgHkooo@80?ooogl
0la@40<0?3gmlOGcloooo03m6APH6MWI
890 "fAUa0@?ooo?Wbi>c\k>OWlO3loo
oQj>c^in3'o'0007YjNP;o0P;dl7X2hO
900 "koOam_L'7e0laOGem?4=h>3Vm^M
WP2o'82NWUkN'?30'4lm0L03kno_3fm7
910 "CdlO7ajNSL00G]kMgL7m'L3NhGi
loTNIam_Mg]h0_l20_@4NP;o0P000?oo
920 "?mooOkoO?ologomo_mlooood203
dl?l0oF=QHO@5ILD43?ooo'3O<3TL3TL
930 "C8C4O0<3oo'7h70a4h30?'o5h70
k6i_IT2?010ol0001jNWX2o'82NWUiN'
940 "Of3Xg=bn_Zj^T0oco?moWn?]kUN
go0oomo03mak]?PlO@4ogR77o@4Ooooo
950 "co3m0CoOglo?mlNjOOgkno?m0S_
Kho_oooooWjm0P;dl7X2o'80003oolOK
960 "flOKflOo'mgM'mOKgOoom0P0m0C
o7YbMW828V;WKWQ'00?oooclOWalO?an
970 "OWilO7cooo'ln6lSdl=WHgmQHm0
EI67h00?l0001jNWP3ka'imL^fM6c[d[
980 ":ZFUZjPWl2h_;bhW;jn_9Bl_Xbl
_;k0_;jnWclm0CnWWod5?l7nognm0[og
990 "ln0P_@4NP;o0P;dl7X2o'80003o
oo@6O@Kol7em3Geml?oom0P0m0Co7hod
1000 "l<o0Q'TC3T3Pml;o03l<3?@4k0
cl30cdlN'<?'00o'0007Xjf^9O'X;dl7
X
1010 "2o'82m0Aj0_l20_@4NP;o0P;dl
7X2o'82m0Aj0_l20WYjN[[2ko;ho_@@o
g
1020 "nogo@9oocj0_@4NP;o0P;dl7X2
o'80003oom3Gem3Gec3oOkno_kViOooo
m
1030 "0P0oooo'9bVQXjN=VKnQPHC<7S
d4_ll<BH<f9Ra\O@5\k6IV<'68C0lo'0
0
1040 "07YjNP;o0P;dl7X2o'82m0Aj0_
l20_@4NP;o0P;dl7X2o'82m0Aj0_l20_
@
1050 "4NP;o0P9j>\[bl__jm0Glm0Kno
?cjnO?goooo_cno?'3dl7X2o'82m0Aj0
_
1060 "l20000oomoooooinMom0[om0P0
ooooh@PoF5PH65mKFAS'00?d4_l7hAP<
A
1070 "^Kclo@5no?fiT'Hh047o'0007Q
hN03l003dl7P0o000m0Ah0?'00?@4N03
l
1080 "003dl7P0o000m0Ah0?'00?@4N0
3l003dl7P0o000m0Ah0?'00?@4N034l?
3
1090 "dl?S'c800m0Ah0?'00?@4N03hm
```

"XPNDR2 and SuperGuide - an Ideal Expansion Card Set"

— RAINBOW 2/86
HARDWARE REVIEW



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```
0@0ml?om0P0oooooQR3aLG1'Hd=PLUg0
0
1100 "3d4_n0_h'<IRHf<c<k>CTm?3'n
OWkdl?10001mO7emO7ioNWeiM71h@V92
H
1110 "TLR8P=7@PP97@\93BAd20TM2PT
=OfioKWm^OfioKWm^0000>gM^GC]gKUd
k
1120 "MfiM>gM^GC]gKUdkMfiM>gM^GC
]gKUdkMfiM<6I^ARIfIUHgMVA@<7L000
3
1130 "ooo@?EOoom0P0oooo7h31Q8201
h>0TXCh007d4_10OAPHCDd]9RH6Rh^;d
M
1140 "7AH61V1PKo00004QXG4QXA4SXG
4QZ9TR9<8TM31T=B@b:30R?30f93@[<<
7
1150 ">'1J?S\o>klk_o^onkokP000;]
gk]fkMnkM^gO^gK]gk]fkMnkH\gCTd;l
f
1160 "k]bjM^cA]W3PgCQbIe<38f?VK7
Q'0@=g0000ood3eGooo@80?@;oo@4Oo
@
1170 "Do'3_PX8D52@X:0TA4A>SXjO7a
l1?3ol000293I0@4A8j5i8Jk?o^Ofho3
P
1180 "7lnncil^O>gbioK3h<'>k?kSn>
PBRlk_l^?lk'k_o^0000\4BO[:'<Slb\
K
1190 "8boP03^gK]gj0;?e]K6ao@4a]n
001\gK]d0>5QH63mH61PHL002M'000?o
o
1200 "m0mEoood203d8olOWalOOgod4?
10000WKQ::4e<oTeKB'3g;h>kok_n^On
c
1210 "lk_o^onkok_o^onkok_o^onkok
_o^o0;ok_o^0000^a26c\K6Q_@4I\<00
>
1220 "gL^7M^0?<E1@713@594NL00;]g
kP5''1C4'<3>'<S@h002M'000?oom0mE
o
1230 "ood203d>O10001OTm3;jmmk3BF
eQ<B>ADD6k_k^onho003Ronkok_o^onk
o
1240 "k_o^onkok_323nkok_o^0000^d
5HFAUIF5TI>ERI4B721@]g3X31QH6018
>
1250 "2WIPE31bkMnkM2<?4a<30c179d
>4007L0003ooo@?EOoom0P0m3Wo0000X
W
1260 "=:FB40NPR97H^93HTMRhT=i?3^
3'hok_o^onkok_o^onkok_cP'bkok_o^
o
1270 "nkokP000;]gk]fkMnkM^gO^gK]
gk]fkMhHPof5PH7aPH6ESa'H=^gO^g@3
m
1280 "HV9PH6IVIV3300Qg0000oood3e
Gooo@80?@io'00018B>1LB6T::2B7a8e
4
```

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```
1290 "A0LPXGTU2h\NRXX?Mfl;Raj;2i
<JTXP88d?SQj>SQhN?AdLP0002kMnkM^
g
1300 "O^gK]gk]fkMnkM^gO^7C\g;Qfk
MnkM^gO^gK]gkPe0o\;0'?W0'<W2o000
M
1310 "'000?@Coo@80?@il00002 0P<?1
P\41PH10PX70PX20'420P@43'@510'21
0
1320 "@?0P821'820'P93@\90@8:1'84
00002'L>3@\73Pd;1'h=2'L>3@\73Pd;
1
1330 "'h=2'L>3@\73Pd;1'h=0'L61@<
73P430'852'L0000?@Cn?@400
1340 CLS3
1350 'RESTART DATA
1360 A=PEEK(116)*256+PEEK(117)-2
0:X=INT(A/256):Y=A-(X*256):POKE1
13,85:POKE114,X:POKE115,Y:FORI=A
 TO A+17:READ B: POKE I,B:NEXTI:
DATA 18,182,255,3,138,1,183,255,
3,189,173,33,189,172,239,126,173
,158
1370 PRINT@228,"LOADING--> pictu
re show";
1380 POKE1270,32
1390 RUN"SHOW.MSP"
1400 PCLEAR8:GOTO110
```

210	198	1100	214
400	88	1200	17
620	210	END	42
860	113		

Listing 2: SHOW

```
10 PMODE4,1:SCREEN1,1
20 A$=INKEY$:IF A$="" THEN 20
30 FORT=1TO4:PCOPY T TO T+4:NEXT
40 P=RND(-TIMER)
50 P=RND(4)-1
60 POKE178,P
70 A=0:B=0:C=255:D=191
80 FORT=1TO100
90 LINE(A,B)-(C,D),PSET,B
100 A=A+1:B=B+1:C=C-1:D=D-1
110 NEXT T
120 B=3:CLS(B)
130 PRINT"do you need instructio
ns  (y/n)?";
140 POKE1026,32:POKE1030,32:POKE
1035,32:POKE1048,32:POKE1049,32:
POKE1050,40:POKE1052,47:POKE1054
,41:POKE1055,63
150 A$=INKEY$:IF A$="" THEN 150
160 IF A$="Y" THEN 1080
170 CLEAR:DIM C$(11),PIC$(68),EX
T$(68)
180 B=3
190 CLS(B)
200 PRINT"    automatic or indiv
idual?"
210 POKE1024,32:POKE1025,32:POKE
1026,32:POKE1027,32:POKE1037,32:
POKE1040,32:POKE1052,32:POKE1053
,32:POKE1054,32:POKE1055,32:POKE
1051,63
220 AI$=INKEY$:IF AI$="" THEN 22
0
230 IF AI$="A" THEN A=1 ELSE A=2
240 PRINT@256,"           (ENTER
)= 0"
250 POKE1279,95
260 PRINT@224,"";:INPUT"ENTER DR
IVE NUMBER (0,1,2,3)";K
270 IF K<0 OR K>3 THEN 200
280 DRIVE K
290 B=3:CLS(B)
300 GOSUB550
310 PRINT@392,"enter the number"
;
320 PRINT@425,"of the picture";
330 POKE1425,32:POKE1421,32
340 POKE1448,32:POKE1451,32:POKE
1455,32:POKE1463,32
350 PRINT@456,"to be loaded";
360 POKE1482,32:POKE1485,32:POKE
1492,45:POKE1493,62
370 POKE1494,32:POKE1495,32
380 PRINT@488,"type (q) to quit"
;
390 POKE1516,32:POKE1517,60:POKE
1519,62:POKE1520,32:POKE1523,32
400 PRINT@470,"";:LINE INPUT"";F
$
410 FORT=1496TO1503:POKE T,62:NE
XT
420 IF F$="Q" THEN 890
430 F=VAL(F$)
440 IF F<1 OR F>C THEN 370
450 P$=PIC$(F)+"/"+EXT$(F)
460 PMODE4,1:PCLS:SCREEN1,1
470 LOADM P$
480 I=7:PMODE4,1
490 IF (PEEK(&H155) AND 8)=0 THE
N I=I+1:IF I=>19 THEN I=19:GOTO5
10
500 IF (PEEK(&H156) AND 8)=0 THE
N I=I-1:IF I<=7 THEN I=7:GOTO510
510 POKE &HBA,I+I:SCREEN1,1
520 IF INKEY$<>CHR$(13) THEN 490
530 GOSUB720
```

```
540 GOTO310
550 'GET FILE NAMES
560 FOR X = 3 TO 11
570 DSKI$ K,17,X,A$,B$
580 IF (LEFT$(A$,1)=CHR$(&HFF))
THEN 600
590 C$(X)=A$+LEFT$(B$,127):NEXT
X
600 POKE&HFF40,0:X=X+1:C=1
610 FOR Y = 3 TO X:FOR Z=0 TO 7
620 IF MID$(C$(Y),Z*32+9,3)="BIN
" OR MID$(C$(Y),Z*32+9,3)="MAX"
OR MID$(C$(Y),Z*32+9,3)="PIC" TH
EN 630 ELSE 680
630 PIC$(C)=MID$(C$(Y),Z*32+1,8)
640 EXT$(C)=MID$(C$(Y),Z*32+9,3)
650 O$=LEFT$(PIC$(C),1)
660 IF (O$=CHR$(0) OR O$=CHR$(&H
FF)) THEN 680
670 C=C+1
680 NEXT Z:NEXT Y
690 IF A=1 THEN GOSUB790
700 C=C-1
710 IF C=0 THEN 1260
720 MID=INT(C/2)+1
730 CLS(B):TAB=1
740 FOR D = 1 TO C
750 PRINT@TAB,USING"##";D;:PRINT
".--> ";PIC$(D);
760 TAB=TAB+32:IF D=MID THEN TAB
=16
770 NEXT D
780 RETURN
790 'AUTOMATIC DISPLAY
800 FOR D=1 TO C-1
810 POKE15870,111
820 IF C=1 THEN 1260
830 PMODE4,1:SCREEN1,1
840 P$=PIC$(D)+"/"+EXT$(D):LOADM
 P$
850 FORT=1TO800:NEXTT
860 IF PEEK(15870)<>111 THEN GOS
UB 990 ELSE PMODE4,1:SCREEN1,1
870 NEXTD
880 C=C-1
890 GOSUB720
900 PRINT@384,"DO YOU WISH TO DO
 ANOTHER DISK? "
910 PRINT@428,"(yes/NO)"
920 FORT=1TO300:NEXTT
930 PRINT@428,"(YES/no)"
940 FORT=1TO300:NEXTT
950 A$=INKEY$:IF A$="" THEN900
960 IF A$="Y" THEN 170
970 IF A$="N" THEN 980 ELSE 950
980 POKE113,0:EXEC40999
990 S=6:IF PEEK(&HC000)=&H44 THE
N S=S+8:U=S+24
1000 PMODE4,1:SCREEN1,1
1010 FORT=1TO500:NEXTT
1020 FOR V=S TO U:GOSUB1070:NEXT
V
1030 FORT=1TO500:NEXTT
1040 FORV=U TO S STEP-1:GOSUB107
0:NEXTV
1050 FORT=1TO500:NEXTT
1060 PMODE4,1:SCREEN1,1:RETURN
1070 POKE&HBA,V:FORT=1TO100:NEXT
T:SCREEN1,1:RETURN
1080 'INSTRUCTIONS
1090 CLS
1100 PRINT"           instructions
"
1110 PRINT:PRINT"GO GET YOU YOUR
 POPCORN AND YOURDIET COKE AND S
IT BACK AND ENJOYTHE SHOW.
1120 PRINT:PRINT"PICTURE SHOW IS
 A VERY EASY TO  USE PROGRAM. IT
 IS MENU DRIVEN  AND GIVES YOU 2
 WAYS TO SEE YOUR";
1130 PRINT"PICTURES."
1140 PRINT@448,"   press spaceba
r to continue   ";
1150 POKE1480,32:POKE1489,32:POK
E1492,32
1160 A$=INKEY$:IF A$="" THEN 116
0
1170 CLS
1180 PRINT"1. automatic---> LETS
 YOU SIT   BACK AND YOUR COMPUTE
R DOES THE REST. IT WILL EVEN SC
ROLL 2 PAGEMAX FILES BUT THEY MU
ST HAVE AN EXTENTION OF <BIN>, <
MAX>, OR   <PIC>.
1190 PRINT"2. individual--> LETS
 YOU PICK  WHICH PICTURE YOU WAN
T TO LOOK  AT. IT WILL ALSO SCRO
LL 2 PAGE  MAX FILES BY USING TH
E UP AND   DOWN ARROW KEYS, THEN
 PRESS THE ";
1200 PRINT"<ENTER> KEY TO GET BA
CK TO THE  MENU. "
1210 PRINT
1220 PRINT@480,"   press spaceba
r to continue ";
1230 POKE1512,32:POKE1521,32:POK
E1524,32
1240 A$=INKEY$:IF A$="" THEN 124
0
1250 GOTO170
1260 CLS(B):DIR
1270 PRINT:PRINT"THERE ARE NO <B
IN>, <MAX>, OR   <PIC> FILES ON
THIS DISK"
1280 FORT=1TO4000:NEXT
1290 GOTO170
```

800-443-1444 ORDERS

SPECIALS

Howard Medical Computers

Zenith 130 Color Monitor $159

Was $399
($14 shipping)

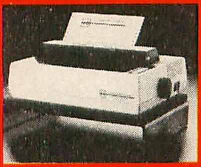
NEW 40 COLUMN

- Medium resolution 2.5 MHz 240 x 200 dots
- Same as 131 except No RGB
- With 90 day Zenith warranty
- **Monitors require video controller See page 34**

Epson RX-80FT $207

Was $318
($7 shipping)

REPACK



- Friction and tractor 80 column
- Bidirectional dot addressable 100 CPS
- **Free Howard Printer tutorial included (a $29.95 value)**

RX100 ....NEW $362

Zenith Green Monitor $67^{50}

Reg. $149
($7 shipping)

REPACK 80 COLUMN

- 12" Zenith 123A Green Screen is easy on the eyes
- High resolution: 640 dots x 200 dots, 15 MHz band width
- Composite video monochrome

J&M Controller $128

JFD-CP with JDOS

Reg. $149
($2 shipping)

- Metal case: I/O buffered
- Parallel port for Gemini and Epson printers
- Hard Disk driver included
- Single switch lets you switch from J DOS to RS DOS
- Gold contacts & data separator

RS DOS ROM $20/ea.

Reg. $40
($2 shipping)

- ROM chip makes J&M compatible
- 24 pin fits both versions of J&M controller
- Release 1.1

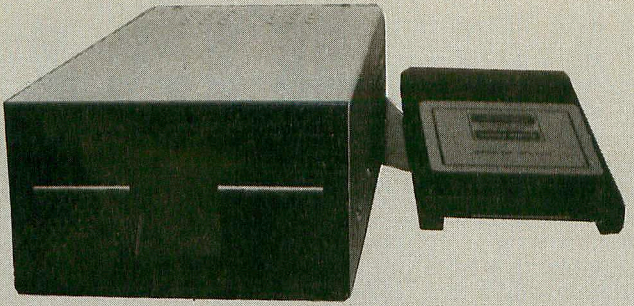
Howard Medical Computers

Box 2, Chicago, IL 60690

Hours: 8-4 Mon.-Fri.
10-3 Sat.

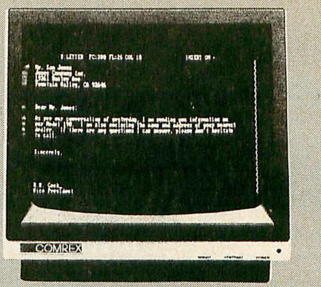
(312) 278-1440

Howard Medical offers a 30-day return guarantee on all hardware we sell. Return equipment to us within 30 days for a refund (less shipping) if you are unsatisfied for any reason. Quantities limited and subject to availability.



Drive 0 and 1 **269^{95}**

One double sided drive with doubler board and new RS controller so you can have the equivalent of 2 drives in one. You can even backup from 0 to 1. Works with all CoCo's.



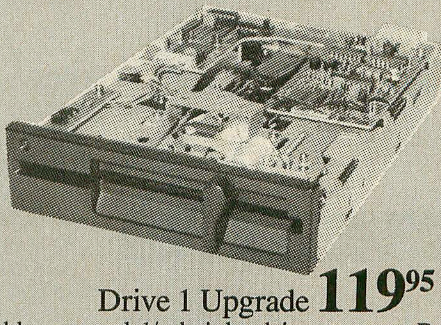
AMBER MONITOR 59^{95}

Epson's Comrex 5650 has a 12" screen with 900 lines. Resolution for 80 column text and 18 MHZ band width, retail price was 139.95. 13" Color Monitor (not shown), now only $139.95. These are new, in factory sealed cartons, NOT used, repacked, or refurbished. Add 7.00 s/h. Monitor Interface for any color Computer 29.95.

---

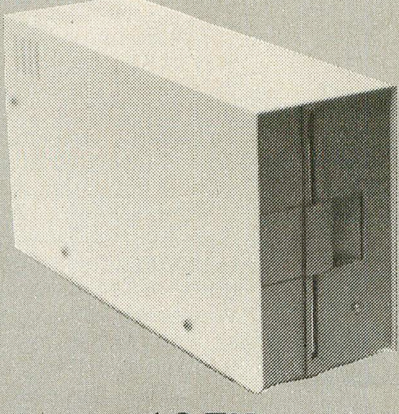
2 Drives **299^{95}**

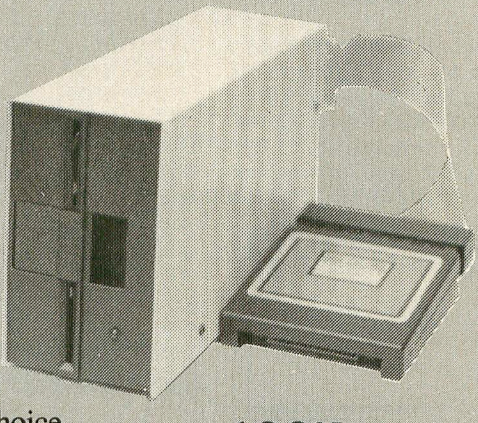
Both our drive 0 and 1 in one case, with cable and R.S. controller. The best just got better!



Drive 1 Upgrade **119^{95}**

Add a second 1/2 height drive to your Radio Shack® 26-3129. Comes with 3 minute installation instructions, screwdriver required. Double sided version (Drive 1 and 2) and doubler board add 79.00





Drive 1 **125^{95}**

Your Choice
Silver or White

199^{95} Drive 0

SUPER DRIVE SALE

Special prices on new first quality disk drives. They even have GOLD connectors on the back... Some other places charge 229.00 for dr. 1 and 299.00 for dr. 0, not us! Drive 1 is for mod I, Second Color Computer drive, or external mod III, IV. Drive 1 just plugs into the extra connector on your Drive 0 cable. Both drives are compatible with any version of the Color Computer and all versions of drives. Drive 0 is your first Color Computer drive and comes complete with cable, manual, and R.S. controller. For double-sided drive and doubler board add 79.00 (for Drive 0 & 1 or 1 & 2). Bare full hgt SSDD drive only 79.95.

THE COMPUTER CENTER
901-761-4565, 5512 Poplar, Memphis, TN 38119

Add $4.90 for shipping and handling—Visa, MC & money orders accepted, No CODs
Allow an additional 2 weeks for personal checks—Drive faceplates may vary slightly

Prices subject to change without notice. Radio Shack is a registered trademark of Tandy Corporation

RAINBOW Info

How To Read Rainbow

Please note that all the BASIC program listings in THE RAINBOW are formatted for a 32-character screen — so they show up just as they do on your CoCo screen. One easy way to check on the accuracy of your typing is to compare what character "goes under" what. If the characters match — and your line endings come out the same — you have a pretty good way of knowing that your typing is accurate.

We also have "key boxes" to show you the *minimum* system a program needs. But, *do* read the text before you start typing.

Finally, the little cassette symbol on the table of contents and at the beginning of articles indicates that the program is available through our RAINBOW ON TAPE service. An order form for this service is on the insert card bound in the magazine.

What's A CoCo?

CoCo is an affectionate name that was first given to the Tandy Color Computer by its many fans, users and owners.

However, when we use the term CoCo, we refer to both the Tandy Color Computer and the TDP System-100 Computer. It is easier than using both of the "given" names throughout THE RAINBOW.

In most cases, when a specific computer is mentioned, the application is for that specific computer. However, since the TDP System-100 and Tandy Color are, for all purposes, the same computer in a different case, these terms are almost always interchangeable.

The Rainbow Check Plus

The small box accompanying a program listing in THE RAINBOW is a "check sum" system, which is designed to help you type in programs accurately.

Rainbow Check PLUS counts the number and values of characters you type in. You can then compare the number you get to those printed in THE RAINBOW. On longer programs, some benchmark lines are given. When you reach the end of one of those lines with your typing, simply check to see if the numbers match.

To use *Rainbow Check PLUS,* type in the program and CSAVE it for later use, then type in the command RUN and press ENTER. Once the program has run, type NEW and press ENTER to remove it from the area where the program you're typing in will go.

Now, while keying in a listing from THE RAINBOW, whenever you press the down-arrow key, your CoCo gives the check sum based on the length and content of the program in memory. This is to check against the numbers printed in THE RAINBOW. If your number is different, check the listing carefully to be sure you typed in the correct BASIC program code. For more details on this helpful utility, refer to H. Allen Curtis' article on Page 21 of the February 1984 RAINBOW.

Since *Rainbow Check PLUS* counts spaces and punctuation, be sure to type in the listing exactly the way it's given in the magazine.

```
10 CLS:X=256*PEEK(35)+178
20 CLEAR 25,X-1
30 X=256*PEEK (35)+178
40 FOR Z=X TO X+77
50 READ Y:W=W+Y:PRINT Z,Y;W
60 POKE Z,Y:NEXT
70 IFW=7985THEN80ELSEPRINT
   "DATA ERROR":STOP
80 EXEC X:END
90 DATA 182, 1, 106, 167, 140, 60, 134
100 DATA 126, 183, 1, 106, 190, 1, 107
110 DATA 175, 140, 50, 48, 140, 4, 191
120 DATA 1, 107, 57, 129, 10, 38, 38
130 DATA 52, 22, 79, 158, 25, 230, 129
140 DATA 39, 12, 171, 128, 171, 128
150 DATA 230, 132, 38, 250, 48, 1, 32
160 DATA 240, 183, 2, 222, 48, 140, 14
170 DATA 159, 166, 166, 132, 28, 254
180 DATA 189, 173, 198, 53, 22, 126, 0
190 DATA 0, 135, 255, 134, 40, 55
200 DATA 51, 52, 41, 0
```

Using Machine Language

Machine language programs are one of the features of THE RAINBOW. There are a number of ways to "get" these programs into memory so you can operate them.

The easiest way is by using an editor/assembler, a program you can purchase from a number of sources.

An editor/assembler allows you to enter mnemonics into the CoCo and then have the editor/assembler assemble them into specific instructions that are understood by the 6809 chip, which controls your computer.

When using an editor/assembler, all you have to do, essentially, is copy the relevant instructions from THE RAINBOW'S listing into CoCo.

Another method of getting an assembly language listing into CoCo is called "hand assembly." As the name implies, you do the assembly by hand. This can *sometimes* cause problems when you have to set up an ORIGIN statement or an EQUATE. In short, you have to know something about assembly to hand-assemble some programs.

Use the following program if you wish to hand-assemble machine language listings:

```
10 CLEAR200,&H3F00:I=&H3F80
20 PRINT "ADDRESS:";HEX$(I);
30 INPUT "BYTE";B$
40 POKE I,VAL("&H"+B$)
50 I=I+1:GOTO 20
```

This program assumes you have a 16K CoCo. If you have 32K, change the `&H3F00` in Line 10 to `&H7F00` and change the value of `I` to `&H7F80`.

The Rainbow Seal

The Rainbow Certification Seal is our way of helping you, the consumer. The purpose of the Seal is to certify to you that any product that carries the Seal has been physically seen by us, that it does, indeed, exist and that we have a sample copy here at THE RAINBOW.

Manufacturers of products — hardware, software and firmware — are encouraged by us to submit their products to THE RAINBOW for certification. We ascertain that their products are, in actuality, what they purport to be and, upon such determination, award a Seal.

The Seal, however, is not a "guarantee of satisfaction." The certification process is different from the review process. You are encouraged to read our reviews to determine whether the product is right for your needs.

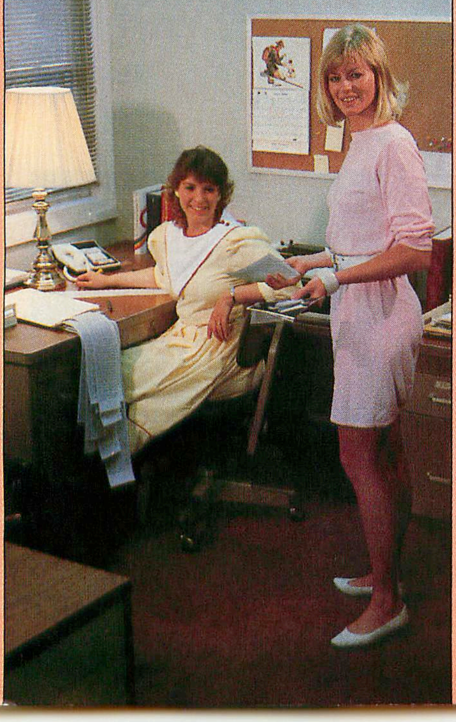
There is absolutely no relationship between advertising in THE RAINBOW and the certification process. Certification is open and available to any product pertaining to CoCo. A Seal will be awarded to *any* commercial product, regardless of whether the firm advertises or not.

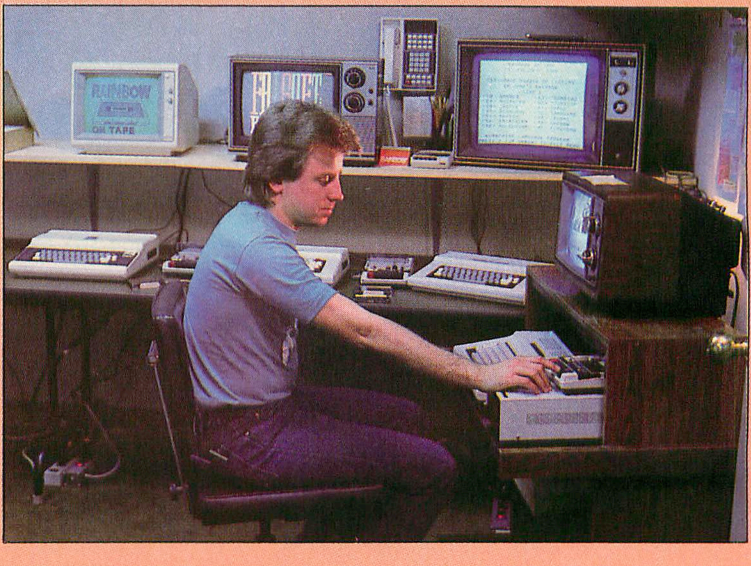
We will appreciate knowing of instances of violation of Seal use.

Fifth Anniversary Special

The Faces of Falsoft: the Rainbow Makers

The story and pictures that follow are our way of celebrating the evolution of THE RAINBOW over the past five years. We want you to meet some of the many folks here in Prospect who help produce THE RAINBOW and its sister publications. At right, Jerry McKiernan, RAINBOW art director, is also Falsoft creative director, overseeing the company's design staff. Below, Jo Anna Arnott (left), RAINBOW copy editor, also manages production of the monthly *MOTD* newsletter. Senior Editor Tamara Dunn divides her time and expertise among several Falsoft publications. RAINBOW ON TAPE production is handled by Mark Herndon, an avid CoCo user outside of work, too.



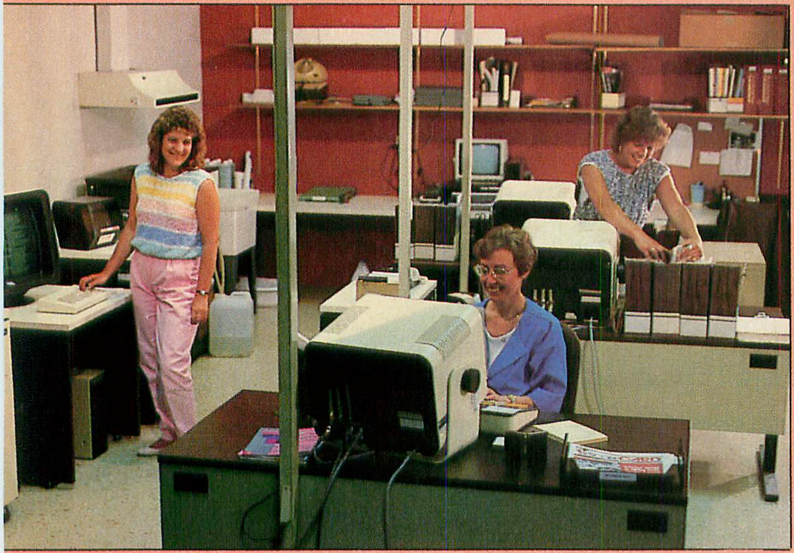


A bit of reflection is generally in order at anniversary time, yet we are forging ahead so quickly these days, it seems almost perilous to take our eyes off the road.

Five years. That's old for a computer magazine, but the emphasis here at Falsoft is unmistakably on the newness of it all. New building. New office equipment. New computers. New publications. And, so many new faces.

What a difference five years makes. Those of us who've been here awhile feel like doting grandparents: "Goodness gracious, Falsoft, my, but you've grown!" Mix in with that, "Wonder how big you'll be in another five years?"

Falsoft Editorial Director Jim Reed is also managing editor of THE RAINBOW and oversees the CoCo SIG on Delphi.

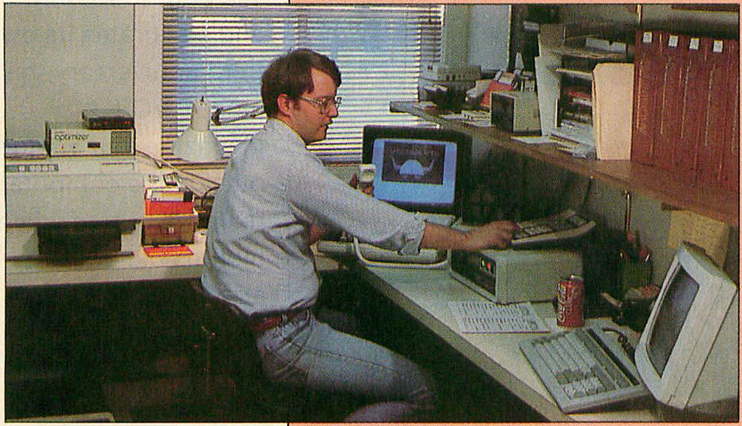


Our typesetting department is headed by Debbie Hartley (left), who also compiles our "Scoreboard" feature. Suzanne Kurowsky (seated) also handles "CoCo Clubs," "Letters to Rainbow" and SCORECARD, our weekly sports publication. Typesetter Jody Doyle is also curator of our popular "CoCo Gallery."

Melba Smith is responsible for in-house printing, such as RAINBOWfest materials, office stationery and disk and tape packaging.

Cameraman John Pike makes plate-ready negatives from art boards of finished pages.

From what began as a hobbyist's two-page newsletter, we now have a still-growing firm of 70-plus employees with seven publications: four monthly magazines and three weekly newspapers. Add to that our RAINBOW ON TAPE service and two disk services, as well as two online information services on Delphi and perhaps you'll forgive our impulse to show you some pictures of the Falsoft family. We just happen to have some right here.

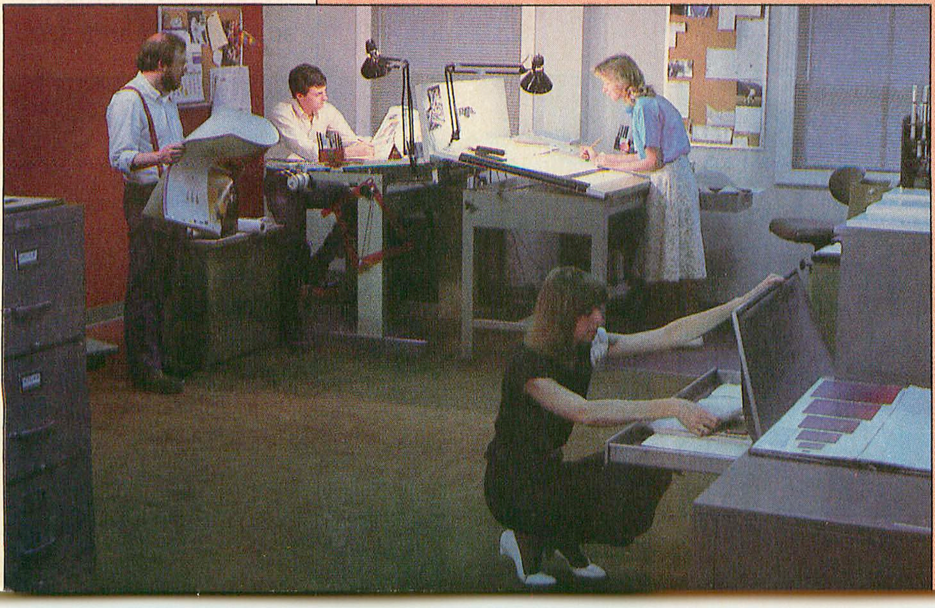


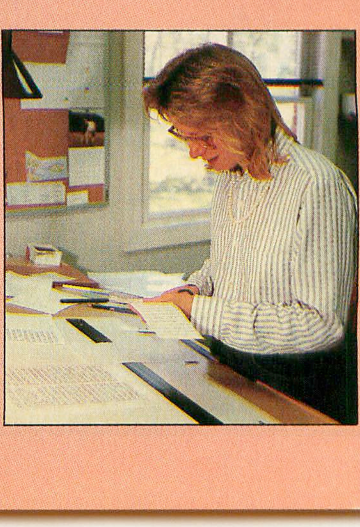
Reviews Editor Judi Hutchinson (above, left) handles product reviews for all of our publications. Editorial Assistant Angela Kapfhammer does proofreading and associated production.

In "CoCo Control," Technical Assistant Cray Augsburg checks programs and prints listings.

In the art department (below left) Jerry McKiernan proofs a matchprint. Designer and *VCR* Art Director Kevin Quiggins and Art Production Manager Cindy Jett (at tables) work on layout and paste-up. SOFT SECTOR Art Director Sandy Underwood (foreground) places completed art in flat files.

Below right, Cindy puts on the finishing touches.





Assistant Editorial Director Jutta Kapfhammer (left) supervises editorial production and coordinates program and article submissions. Shirley Morgan keeps the editorial "copy flow" moving. Former RAINBOW staff member Ed Ellers (below left) is now managing editor of SOFT SECTOR, our monthly for Sanyo computer users. Chris Wehner handles the technical side of PCM. At bottom left is PCM Art Director Tracey Jones. RAINBOWfest Coordinator Judy Brashear (seated) discusses the show catalog layout with designer Heidi Maxedon, who is also art director of SCORECARD.

While THE RAINBOW is clearly Falsoft's flagship publication, PCM has climbed to 132 pages monthly and celebrates its own third anniversary this month. VCR Magazine, our venture outside the computer realm, is scarcely five months old but is already up to 80,000 issues monthly.

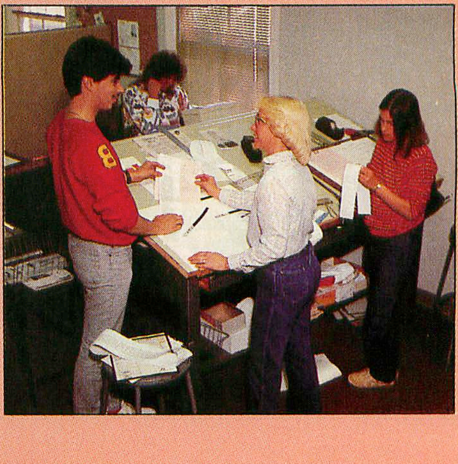
With our own in-house design staff, typesetting operation, subscription and support services and even our own camera room, our editorial operation can create, launch and maintain a wide variety of publishing interests. At this writing, four books are in various stages of production. In this fifth year of Falsoft, we are using some five railroad cars of paper each month. Our ink comes in barrels. Yes, we're proud of how far we've come, and we're excited about the road ahead. Clearly, these are team pictures!

Sue Rodgers (at left, above) is administrative assistant to the publisher while Patricia Hirsch, the very first on the Falsoft payroll, is now general manager of the company.

Business Assistant Monica Wheat (standing) talks to Receptionist Pam Workhoven, whose friendly voice you usually hear when calling us.

While Advertising Representative Kim Vincent (left) and Doris Taylor, Falsoft advertising coordinator, are located in our Prospect headquarters, we are also represented by McVey-Michaels in New York, Garland Associates in Boston and Shackleford, Nolan, Davis, Gregg and Associates on the West Coast.

Our weekly newspaper specialists (below) include David Miller, Skyline managing editor, talking with Judy Colgate, production manager. Paste-up artist Jody Gilbert is at right and across the table is Classified Advertising Coordinator Teresa Willett.



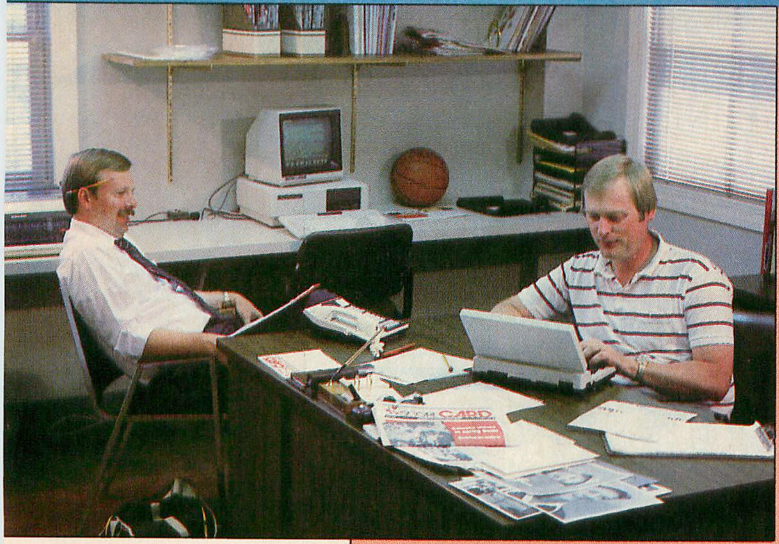
These aren't all the faces of Falsoft. Our list of contributors now numbers in the hundreds: personal computer programmers to sports commentators, hardware hackers to media critics, nationally-known authors to local newspaper journalists, the Falsoft crew makes quite a crowd. Yet, from shipping clerk to senior editor, advertising representative to bookkeeper, artist to technician, secretary to production manager, we all share a common bond with Lonnie Falk, the founder of Falsoft: as far as we've come in these past five years, wherever we go

In subscription and support services (left to right), Patricia Eaton is word processing manager. Department director is Bonnie Frowenfeld, shown speaking with Beverly Bearden, assistant customer service manager. Sandy Apple is assistant director of fulfillment services, while Sharon Smith (back, right) is a business assistant.

Chief Bookkeeper Diane Moore checks a ledger while Donna Shuck, assistant general manager for finance, sums it up.

Mark Herndon makes 11 copies of RAINBOW ON TAPE with each 45-second pass, but it still takes days to produce the 8,000 or more tapes sold monthly.

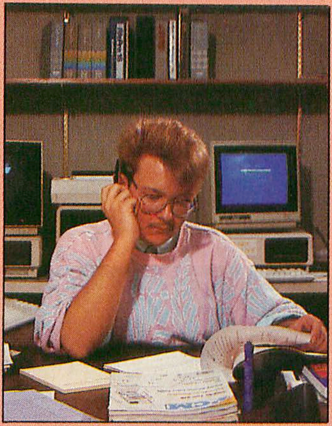
Janice Eastburn, who is in charge of dispatch, selects a few cassettes to fill a back issue order.



Sportswriter Garry Jones (left) confers with SCORECARD Editor John Crawley. SCORECARD covers University of Louisville sports.

Below, Judy Quashnock, of dealer accounts, visits Advertising Assistant Debbie Baxter.

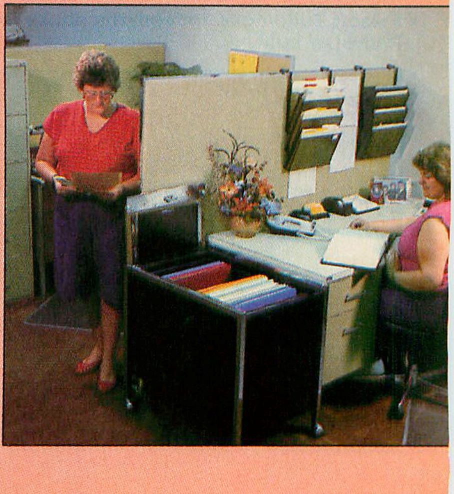
from here and whatever we find, we'll always share that special excitement that comes from examining our own copy of still another edition, delivered while the presses are still rolling. There's a special something that the very latest issue always holds for all of us. And, this time, our picture's in it!



PCM Managing Editor Danny Humphress (above) does custom programming when he finds time.

Belinda Kirby (standing) is editorial manager of *The East End Voice* and the *Louisville Skyline*, while Jean Fultz handles the newspapers' accounting.

VCR magazine's Managing Editor Kevin Nickols (left) has a picture selection session with *VCR* Executive Editor Vince Staten.



Beverly Taylor (standing) handles advertising accounts and Lisa Ragan is in accounts payable/ADP.

FALSOFT BUILDING

The many faces of Falsoft, assembled for the first time just for RAINBOW readers. About seven minutes together and then it was back to business as usual.

Smile quickly, we're on deadline!

Business Assistant Laurie Falk (left) and Editorial Assistant Michele Hardman take a moment to visit in the reception area.

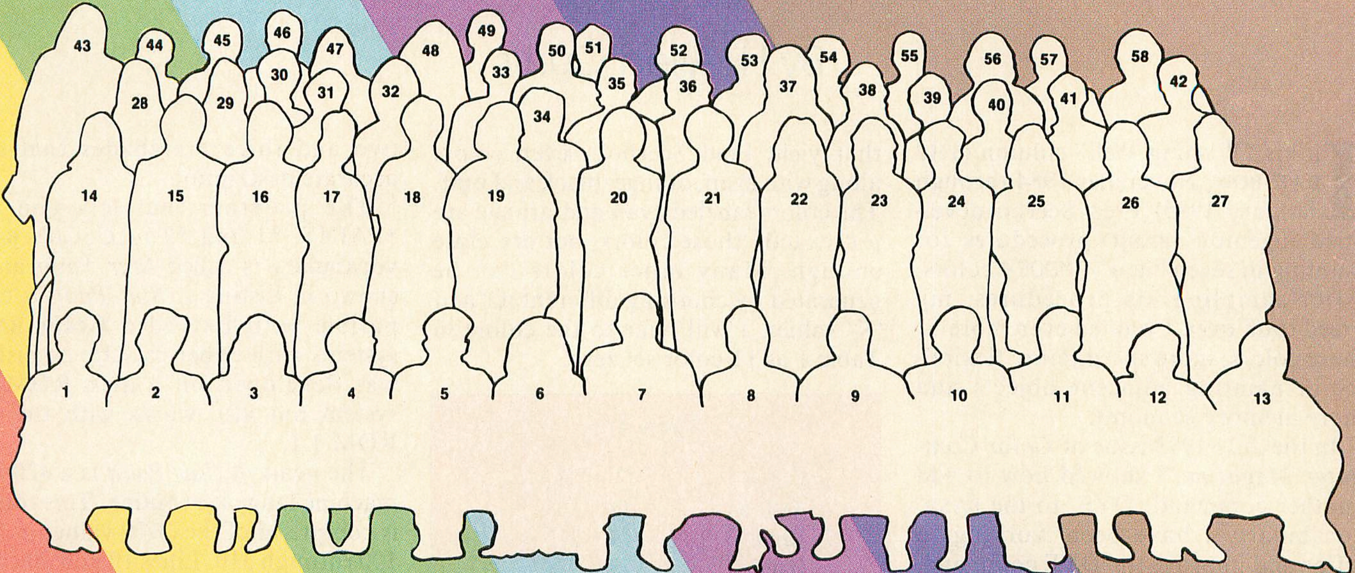
Located just outside of Louisville, Kentucky, in the small town of Prospect, the Falsoft Building is, indeed, the house that RAINBOW built.

FALSOFT BUILDING

"I guess it's a trifle out of the ordinary for a magazine's staff to bask in its own spotlight, so to speak, but we like to think we've earned ourselves a moment of recognition and celebration. It's our way of stopping to smell the roses and having a bit of an open house, too. It's also a way to share our Fifth Anniversary album with the entire CoCo Community."

— Lonnie Falk

Folks of Falsoft



FRONT ROW

1) Suzanne Benish Kurowsky
2) Janice Eastburn
3) Debbie Hartley
4) Jody Doyle
5) Danny Humphress
6) Tracey Jones
7) Lonnie Falk
8) Heidi Maxedon
9) John Crawley
10) Ed Ellers
11) David Miller
12) Chris Wehner
13) Jerry McKiernan

SECOND ROW

14) Jody Gilbert
15) Judy Colgate
16) Donna Knebel
17) Kim Vincent
18) Doris Schroering
19) Judy Quashnock
20) Sandy Apple
21) Bonnie Frowenfeld
22) Beverly Bearden
23) Jo Anna Arnott
24) Pat Hirsch
25) Angela Kapfhammer
26) Lauren Pack
27) Jutta Kapfhammer

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28) Sandra Underwood
29) Cindy Jett
30) Shirley Morgan
31) Melba Smith
32) Pat Eaton
33) Diane Moore
34) Doris Taylor
35) Beverly Taylor
36) Monica Wheat
37) Judy Brashear
38) Lisa Ragan
39) Judi Hutchinson
40) Sheri Taylor
41) Sue Rodgers
42) Tim Shaw

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43) Tamara Dunn
44) Kenneth Hayden
45) John Pike
46) Kevin Nickols
47) Belinda Kirby
48) Sharon Smith
49) Ray Baldwin
50) Donna Shuck
51) Cray Augsburg
52) Pam Workhoven
53) Debbie Baxter
54) Jean Fultz
55) Tom Cecil
56) Teresa Willett
57) Garry Jones
58) Jim Reed

"Picture Day" at Falsoft was the first time we've brought so many of our folks together at once. Nonetheless, there were several "excused absences" that were, shall we say, creative.

Laurie Falk, for instance, was "being fitted with my cap and gown." Her Ballard High School graduation was a few days away. As for Michele Hardman, "I had to go with Laurie."

Jeanne Rieber was late, "because somebody pulled the stems off of two tires on my new car." Jerry Hunley was "hung up at an advertiser's," while Bob Woerner says he was "washing newspaper racks."

Joe Edmondson was on another fishing trip, but Dan Downard declared "Halley's Comet got me off schedule." Moonlight singer Brent Watson "had a noontime gig, man."

"Oh gosh, the baby cried all night," said Carol Timmons, blaming it all on 4-month-old Mary Brooke. Judd Tenenbaum claimed our scheduled time "conflicted with my appointment for the tanning booth," and Wendy Falk was way up in Badger Land, taking final exams at the University of Wisconsin.

West Coasters Cindy Shackleford and Shirley Duranseau were in Puyallup, Washington. Bill McVey was in New York; Rich DiGiacomo, L.A.; and Jack Garland in Massachusetts. Pierce and Edith Taylor were across the street, "Are we on daylight time again?"

"Picking up some cables at Radio Shack," pleaded Mark Herndon, but Kevin Quiggins was "right there in the back row — I was tying my shoe."

Festive CoCo: Ready to PAINT the Town

By H. Allen Curtis

In his "Wishing Well" column (THE RAINBOW, November 1984 through January 1985) Fred Scerbo developed ingenious BASIC procedures for painting in seven "new" PMODE4 colors. After sampling his procedures, my greed took over. I wanted even more — more colors, more speed, more flexibility in painting adjacent objects and more memory economy.

In the July 1983 issue of *Color Computer Magazine*, I showed how to add another command, DYE, to the BASIC vocabulary. I have been working to refine and improve the DYE command. The result is a new BASIC command, *PAINT. It works somewhat like PAINT but can paint a multitude of colors and is much faster.

The format is *PAINT X,Y, C, K; where 'X' is a number (zero to 255) that defines the X-coordinate, 'Y' is a number (zero to 191) that defines the Y-coordinate, 'C' is a number (zero to 255) specifying the odd-row color combination, and 'K' is a number (zero to 255) specifying the even-row color combination. Note the absence of parentheses in the *PAINT format.

As in the PAINT command, the 'X' and 'Y' values correspond to coordinates within the object to be painted. Using Fred Scerbo's procedures, the odd rows of any painted object are one color combination and the even rows another. Objects painted with *PAINT use the same idea, but with 'C' and 'K' controlling the color combinations of alternate rows. *PAINT only works on a buff background.

Table 1 gives the values of 'C' and 'K' that yield Fred Scerbo's seven colors along with cyan, orange, black and buff. The colors labeled cyan and orange are not exactly those colors, but are close enough. Many other colors can be generated by choosing different 'C' and 'K' values. I will refer to the colors in Table 1 as 11-color set zero.

Table 1

Color	C	K
Yellow	238	187
Blue	119	221
Gold	128	8
Silver	204	51
Purple	136	68
Lime	64	4
Violet	85	170
Cyan	85	85
Orange	170	170
Black	0	0
Buff	255	255

There are two short commands, *1 and *2, complementing *PAINT. These commands allow convenient switching to three additional 11-color sets: one, two and three. Color sets one, two and three can be obtained from color set zero by executing *1, *2, and both *1 and *2, respectively. Cyan, orange, black and buff are common to all four color sets. The other colors in sets one, two and three are shades that defy accurate description.

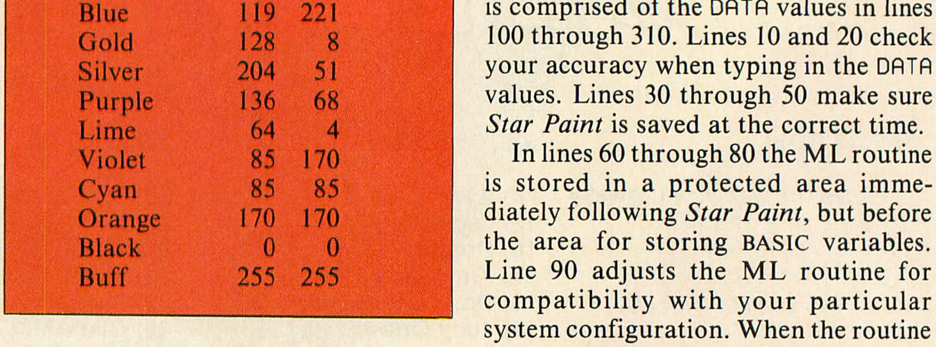
The program that lets you add *PAINT, *1 and *2 to CoCo's BASIC vocabulary is called *Star Paint* and is shown in Listing 1. *Star Paint* is compatible with Extended Color BASIC systems with either cassette or disk. It was developed on a disk ROM 1.0 system but also works with the disk ROM 1.1.

The heart of *Star Paint* is a 420-byte machine language routine. This routine is comprised of the DATA values in lines 100 through 310. Lines 10 and 20 check your accuracy when typing in the DATA values. Lines 30 through 50 make sure *Star Paint* is saved at the correct time.

In lines 60 through 80 the ML routine is stored in a protected area immediately following *Star Paint*, but before the area for storing BASIC variables. Line 90 adjusts the ML routine for compatibility with your particular system configuration. When the routine is stored, lines 10 through 310 are no longer needed and are deleted by the last command in Line 90.

Special care should be taken in typing all lines containing PEEKs and POKEs — lines 2, 60, 70, 80 and 90. Any mistakes could cause loss of the program when run.

When *Star Paint* has been typed in and saved, run it. After the break in



H. Allen Curtis lives in Williamsburg, Virginia. He is interested in 17th and 18th century history and enjoys biking through the colonial capital. He balances past and present with his computer work.

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Line 50, type `CONT` and press ENTER to continue program execution. When execution is finished, list the program. Notice it now contains only two lines of BASIC: the `REM` statements in lines 1 and 2. Make Line 2 an active one by deleting the `REM`. Do not delete any other part.

To determine whether or not you now have a correctly working version of *Star Paint*, add the following lines to the program:

```
10 PMODE4,1:PCLS1:SCREEN1,1:
*PAINT128,96,85,170
20 GOTO20
```

Then run the augmented program. If the screen is quickly painted violet (alternating lines of cyan and orange) then it is fine. Otherwise, check over Listing 1.

Once *Star Paint* is working, delete lines 10 and 20 and save the resulting version. To use the *PAINT command in a program you are writing, load the two-line version of *Star Paint* and add your program.

The two-line version must always be used with the same system configuration as the one on which it was generated. For use with another system configuration, run the Listing 1 version of *Star Paint* on that particular system to generate another two liner.

A Rainbow

Listing 2 demonstrates some of the capabilities and idiosyncrasies of the *PAINT command. It also provides a reasonable facsimile of THE RAINBOW logo. To obtain Listing 2, start with the two-line *Star Paint* and type lines 3 through 390.

Note that lines 6 through 15 contain the color palette for painting with nine colors from color set zero. The color associated with Line 6 is yellow and is indicated by the letter 'Y' following `GOTO15`. The colors associated with lines 7 through 14 are indicated in a similar fashion. Non-numerical characters can be appended to `GOTO` line numbers with no effect. This offers a handy and inexpensive `REM` facility.

When the logo program is run, the screen should be painted orange. If the screen turns cyan, press the Reset button and rerun the program. Continue the sequence until you obtain an orange screen. Fred Scerbo's colors were defined relative to the production of orange when each screen byte has a value of 170, hence the necessity for the color synchronization process.

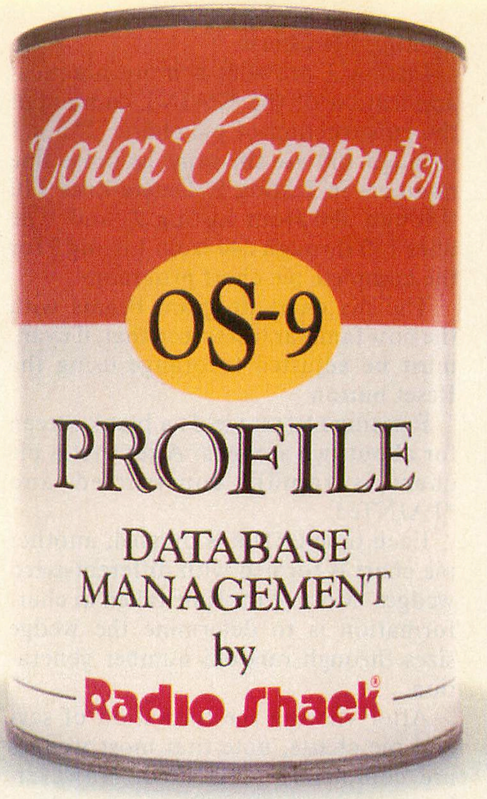
After obtaining an orange screen, press ENTER to start meaningful program execution. Note the drawing of nature's rainbow is quickly painted, whereas the name, RAINBOW, is comparatively slow in being generated. The former was painted with *PAINT and the latter with `PAINT` before being moved via `GET`s and `PUT`s. Remember, *PAINTing must always occur on a buff background; thus, *PAINT could not be used to paint the name RAINBOW over the already-painted rainbow.

You might ask, why not draw and *PAINT the name, RAINBOW, first? Then, draw and *PAINT the rainbow around the name. Besides being more complex to produce the logo in such a manner, the *PAINT command cannot always fill in small areas and the resulting logo would probably be less pleasing to the eye.

Lines 130 through 180 are used to paint the six arcs of the rainbow. For instance, the orange arc of Line 130 is painted using the *PAINT command three times at three different sets of X, Y coordinates. This illustrates that the number of *PAINTs needed to fill an

Listing 1: `PAINT 1`

```
1 REM *** STAR PAINT ***
      BY H. ALLEN CURTIS
      COPYRIGHT (C) 1985
2 REM POKE334,158:POKE335,27:POK
E336,110:POKE337,26:POKE401,126:
POKE402,1:POKE403,78
10 FORI=0TO419:READD$:D=VAL("&H"
+D$):C=C+D:NEXT:CLS
20 IFC<>44617THENPRINT"DATA ERRO
R":STOP
30 PRINT@162,"IF YOU HAVE NOT AL
READY SAVED   STAR PAINT, DO SO
NOW."
40 PRINT:PRINT"  IF YOU HAVE SAV
ED STAR PAINT,   TYPE CONT AND P
RESS ENTER."
50 STOP
60 X=256*PEEK(27)+PEEK(28)+420:A
=INT(X/256):B=X-256*A
70 POKE474,A:POKE475,B:POKE27,PE
EK(474):POKE28,PEEK(475):CLEAR
80 X=256*PEEK(27)+PEEK(28):M=X-4
20:FORI=M TOM+419:READD$:D=VAL("
&H"+D$):POKEI,D:NEXT
90 FORJ=0TO2:POKEM+4+J,PEEK(401+
J):NEXT:DEL10-
100 DATA 81,AD,27,3,7E,C2,4D,9D,
9F,81,C3,27,23,8B,79,81,AA,27
110 DATA 5,44,81,55,26,EC,97,50,
9E,BA,33,89,18,0,DF,51,9D,9F,A6
120 DATA 84,98,50,A7,80,9C,51,26
,F6,35,90,86,3,97,7C,9D,9F,BD
130 DATA B7,3D,34,10,32,61,BD,B2
,6D,A,7C,26,F2,BD,B7,3D,9F,42
140 DATA 35,54,D7,42,D7,45,1F,10
,C6,20,3D,D3,BA,1F,3,1F,10,54
150 DATA 54,54,8D,2B,F,44,1F,32,
8D,11,3,7C,D6,50,8D,1F,33,A8,E0
160 DATA D6,43,D7,45,C6,FF,D7,44
,1F,31,DC,BA,C3,17,E1,DD,7D,9C
170 DATA 7D,25,1,39,1F,30,93,BA,
2A,9,1F,98,DD,50,5A,4C,DD,52,39
180 DATA D6,51,3A,A6,84,5C,D1,52
,26,59,5A,D1,53,26,17,81,FF,27
190 DATA EC,84,3,81,3,27,5E,A6,1
,81,FF,27,6,84,C0,81,C0,27,52,39
200 DATA 5A,D1,53,22,26,81,FF,27
,48,E6,1F,C1,FF,26,4,C,53,20,DA
210 DATA 84,C0,81,C0,26,8,A,51,A
,52,30,1F,20,30,A6,84,84,3,81,3
220 DATA 26,CA,20,26,81,FF,27,22
,A,51,30,1F,A6,84,81,FF,27,18,A
230 DATA 52,20,D2,5A,5A,D1,53,22
,E,81,FF,27,A,E6,1,C1,FF,26,A0,C
240 DATA 51,30,1,96,51,97,53,E6,
```



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object depends on the shape of the object. More common objects such as rectangles and circles can be painted with one *PAINT, but with other objects you have to experiment to determine the number of *PAINTs needed.

Generally, *PAINT fills in objects as follows: It paints downward until a local minimum is found at the boundary or until it reaches a pointed area too narrow to paint. It then paints upward in an analogous manner.

To produce the rainbow, the arcs are sequentially *PAINTed from top to bottom with one exception, the fourth arc is *PAINTed last. The fourth arc, the blue one, was *PAINTed after the fifth, the cyan arc, to prevent bleeding. *PAINTing an object a darker color than an adjacent object can *sometimes* cause bleeding of the darker color onto the adjacent object.

Upon the completion of THE RAINBOW logo, the program goes into a closed loop in which the color sets are continually changed by means of the *1 and *2 commands of Line 360. Press the BREAK key to terminate the program. To see the program execute without the color set changes, delete Line 360 and rerun the program.

Making Pie Charts

Listing 3 provides a more practical application of the *PAINT command: the construction of pie charts. Lines 1 through 100 are the same as those line numbers in Listing 2. Delete lines 110 through 390 from Listing 2, and type lines 110 through 240 from Listing 3 for the complete pie chart program.

The pie chart program begins with the now familiar test screen that, if cyan, must be adjusted to orange using the Reset button.

Pressing ENTER yields a blank screen for about two seconds. After that a pie chart is rapidly constructed and *PAINTed.

Each time ENTER is pressed, another pie chart is formed with different-sized wedges. Most of the time taken in chart formation is to determine the wedge sizes through random number generation.

After viewing the formation of several pie charts, note that most wedges are completely *PAINTed. However, because of the smaller size and/or orientation of some wedges, the *PAINTing is not complete. The central circle is used to hide imcompletely *PAINTed wedges. For a better cover-up of insufficient *PAINTing, change `SCREEN1,1` in Line 130 to `SCREEN0,1`.

It should be mentioned that the X,Y coordinates for *PAINTing are calculated as the size and orientation of each wedge is determined. The calculations are made in such a way that only one *PAINT command is required for each wedge drawn.

Painting with Other Color Sets

In both of the demonstration programs, objects were initially *PAINTed with the colors of color set zero and other color sets were obtained by executing the *1 and *2 commands. There may be occasions when you want to *PAINT directly with color sets one, two and three. Table 2 has been included to facilitate direct *PAINTing.

In the table, the numbered suffixes for 'C' and 'K' indicate the associated color set. The "CI," "KI" values (I = one, two or three) in the first row of Table 2 are those obtained by executing *1, *2, or both *1 and *2 on yellow values in color set zero. There are analogous correspondences in the other rows of the table.

```
84,C1,FF,26,3C,D6,45,E7,84,30,1F
250 DATA A,53,2A,F0,D6,51,1F,31,
5C,3A,D7,52,E6,84,C1,FF,26,4B,D6
260 DATA 45,E7,80,C,52,C6,20,D1,
52,26,EE,33,C8,E0,D,7C,26,3,33
270 DATA C8,40,3,44,26,3,96,42,8
C,96,43,97,45,16,FF,26,E6,84,57
280 DATA 24,C9,57,24,C6,57,24,F,
57,24,C,57,24,C,57,24,9,E6,84,D4
290 DATA 45,20,9,C6,F0,8C,C6,C0,
DA,45,E4,84,E7,84,20,A7,E6,84,58
300 DATA 24,BC,58,24,B9,58,24,F,
58,24,C,58,24,C,58,24,9,E6,84,D4
310 DATA 45,20,9,C6,F,8C,C6,3,DA
,45,E4,84,E7,84,20,9A,16,FE,5F,0
,0,0
```

Listing 2: PAINT 2

```
1 REM *** STAR PAINT ***
      BY H. ALLEN CURTIS
      COPYRIGHT (C) 1985
2 POKE334,158:POKE335,27:POKE336
,110:POKE337,26:POKE401,126:POKE
402,1:POKE403,78
3 PMODE4,1:PCLS1:SCREEN1,1:GOSUB
14
4 IFINKEY$=CHR$(13)THENCLS0:PMOD
E4,1:SCREEN0,0:GOTO100ELSE4
5 ' COLOR PALETTE
6 C=238:K=187:GOTO15Y
7 C=119:K=221:GOTO15B
8 C=128:K=8:GOTO15G
9 C=204:K=51:GOTO15S
10 C=136:K=68:GOTO15P
11 C=64:K=4:GOTO15L
12 C=85:K=170:GOTO15V
13 C=85:K=85:GOTO15C
14 C=170:K=170:GOTO15O
15 *PAINTX,Y,C,K:RETURN
100 PCLS1:COLOR0,1:SCREEN1,1
110 CIRCLE(128,96),142,0,.5,.575
,.94:CIRCLE(128,100),138,0,.5,.5
8,.93:LINE(0,66)-(255,66),PSET
120 CIRCLE(128,104),133,0,.5,.6,
.92:CIRCLE(128,108),129,0,.5,.62
,.9:CIRCLE(128,112),125,0,.5,.64
,.875:CIRCLE(128,116),121,0,.5,.
67,.85:CIRCLE(128,120),117,0,.5,
.7,.8
130 X=127:Y=30:GOSUB14:X=12:Y=60
:GOSUB15:X=190:Y=36:GOSUB15
140 X=128:Y=34:GOSUB6:X=16:Y=64:
GOSUB6:X=40:Y=50:GOSUB6:X=180:Y=
```

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Table 2

C0	K0	C1	K1	C2	K2	C3	K3
238	187	68	17	187	238	17	68
119	221	221	119	34	136	136	34
128	8	42	162	213	93	127	247
204	51	102	153	153	102	51	204
136	68	34	238	221	27	119	187
64	4	234	174	21	81	191	251
85	170	255	0	0	255	170	85
85	85	255	255	0	0	170	170
170	170	0	0	255	255	85	85
0	0	170	170	85	85	255	255
255	255	85	85	170	170	0	0

Using `POKE178,n` to paint objects with various color combinations has been popular. Those same color combinations are easily achieved with the *PAINT command and often at greater speed.

Listing 4 demonstrates this *PAINT capability. This program consists of the two-line version of *Star Paint* with five other lines.

The demonstration begins by painting the screen using the `POKE178,n`. The color combination is randomly selected. When the screen is painted, there is a pause, then a position on the screen is examined to determine the 'C' and 'K' values needed to reproduce the screen's present color combination. Next the screen is cleared to buff and *PAINTed. This program illustrates the extreme speed advantage of *PAINT.

In Conclusion

In *PAINTing, a color combination is filled in horizontally until a drawn boundary is reached at each side. If there is no boundary at the right, for instance, painting can continue to the next line at the left of the screen. To prevent this, draw a vertical line at the right and/or left boundary of the screen before *PAINTing such areas. The lines can be removed later.

Without the two-line version of *Star Paint*, the commands *PAINT, *1 and *2 do not execute but produce SN errors. The hook address to the computer's error-processing subroutine was changed to an address leading to *Star Paint*'s own error-processing subroutine, which accepts *PAINT, *1 and *2 as valid BASIC commands and initiates their execution.

Because of the location of the ML routine that contains the error-processing routine, establishing an acceptable hook address is no trivial matter. Every time you add, delete or change a line of BASIC programming, the location of the error-processing subroutine is likely to change. A fixed hook address, RAM address 334, was chosen.

Line 2 of the two-line version of *Star Paint* `POKE`s a four-byte, ML subroutine to addresses 334 through 337. The four-byte subroutine calculates the current entry address of the error-processing subroutine and causes entry to it. Addresses 334 through 337 are ordinarily employed in storing `USR8` and `USR9` addresses in strictly cassette-based systems. Therefore, the use of *Star Paint* places a small restriction on those systems. `USR8` and `USR9` must not be used in programs with *PAINT, *1 or *2.

Now that *PAINT can be added to CoCo's BASIC repertoire, I wish Fred Scerbo would put his remarkable programming skills to work in producing a *PAINTed graphics masterpiece.

(You may direct questions about this program to Mr. Curtis at 172 Dennis Drive, Williamsburg, VA 23185, phone 804-229-7086. Please enclose an SASE when writing.) ☐

```
42:GOSUB6:Y=64:X=236:GOSUB6:X=24
:Y=56:GOSUB6
150 X=170:Y=46:GOSUB12:X=56:Y=50
:GOSUB12:X=31:Y=64:GOSUB12
160 X=127:Y=55:GOSUB13:X=55:Y=66
:GOSUB15:X=190:Y=60:GOSUB15:X=16
0:Y=58:GOSUB15
170 X=127:Y=60:GOSUB10:X=90:Y=64
:GOSUB15:X=165:GOSUB15
180 X=127:Y=50:GOSUB7:X=40:Y=64:
GOSUB15:X=180:Y=54:GOSUB15
190 LINE(0,66)-(255,70),PRESET,B
F
200 DIMR(90)
210 DRAW"BM0,150U36R20FR2FR2FRFD
FDFD3GD2GLGL2GL2R2FRFRFDFD12F2L9
U9HU2H2LHL9D15L8R8U14BU9U7R9FRF2
D2G3L10":PAINT(3,146),0,0
220 GET(0,110)-(40,150),R,G:PUT(
1,20)-(41,60),R,AND:GOSUB380
230 LINE(36,150)-(50,114),PSET:L
INE-(59,114),PSET:LINE-(73,150),
PSET:LINE-(66,150),PSET:LINE-(63
,142),PSET:LINE(60,136)-(55,122)
,PSET:LINE-(50,136),PSET:DRAW"M+
0,+0NR10BD5BL2NR14":LINE-(44,150
),PSET:LINE-(36,150),PSET:PAINT(
38,148),0,0
240 GET(36,110)-(73,150),R,G:PUT
(36,20)-(73,60),R,AND:GOSUB380
250 DRAW"BM78,150U36R9D36L9":PAI
NT(80,148),0,0
260 GET(78,110)-(88,150),R,G:PUT
(78,20)-(88,60),R,AND:GOSUB380
270 LINE(92,150)-(92,114),PSET:L
INE-(103,114),PSET:LINE-(117,140
),PSET:LINE-(117,114),PSET:LINE-
(125,114),PSET:LINE-(125,150),PS
ET:LINE-(114,150),PSET:LINE-(100
,124),PSET:LINE-(100,150),PSET:L
INE-(92,150),PSET:PAINT(94,148),
0,0
280 GET(92,110)-(125,150),R,G:PU
T(92,20)-(125,60),R,AND:GOSUB380
290 DRAW"BM130,150U36R22FR2FR2FR
FDFDFD3GD2G2LGLGR2FRFDFDFD4GD2GD
GLGLGL25BR8BU22U8R13FRFD4GLGL13B
D6R11FRFRDFD3GDLGL13U10":PAINT(1
32,148),0,0
300 GET(130,110)-(172,150),R,G:P
UT(130,20)-(172,60),R,AND:GOSUB3
80
310 CIRCLE(184,132),18,0,1.08:CI
RCLE(184,132),12,0,1:PAINT(184,1
47),0,0
320 GET(166,110)-(202,152),R,G:P
UT(166,21)-(202,63),R,AND:GOSUB3
80
330 LINE(212,150)-(202,114),PSET
:LINE-(211,114),PSET:LINE-(217,1
38),PSET:LINE-(223,114),PSET:LIN
E-(233,114),PSET:LINE-(239,138),
PSET:LINE-(245,114),PSET:LINE-(2
54,114),PSET:LINE-(244,150),PSET
:LINE-(234,150),PSET:LINE-(228,1
26),PSET:LINE-(222,150),PSET
340 LINE-(212,150),PSET:PAINT(21
4,148),0,0
350 GET(202,110)-(255,150),R,G:P
UT(202,20)-(255,60),R,AND:GOSUB3
80
360 GOSUB390:*1:GOSUB390:*2:GOTO
360
370 GOTO370
380 LINE(0,110)-(255,152),PRESET
,BF:RETURN
390 FORI=1TO500:NEXT:RETURN
```

Listing 3: PAINT 3

```
1 REM *** STAR PAINT ***
      BY H. ALLEN CURTIS
      COPYRIGHT (C) 1985
2 POKE334,158:POKE335,27:POKE336
,110:POKE337,26:POKE401,126:POKE
402,1:POKE403,78
3 PMODE4,1:PCLS1:SCREEN1,1:GOSUB
14
4 IFINKEY$=CHR$(13)THENCLS0:PMOD
E4,1:SCREEN0,0:GOTO100ELSE4
5 ' COLOR PALETTE
6 C=238:K=187:GOTO15Y
7 C=119:K=221:GOTO15B
8 C=128:K=8:GOTO15G
9 C=204:K=51:GOTO15S
10 C=136:K=68:GOTO15P
11 C=64:K=4:GOTO15L
12 C=85:K=170:GOTO15V
13 C=85:K=85:GOTO15C
14 C=170:K=170:GOTO15O
15 *PAINTX,Y,C,K:RETURN
100 PCLS1:COLOR0,1:SCREEN1,1
110 DIMW(95):SCREEN0,1:PCLS1:CIR
CLE(30,30),30,0,1:PAINT(30,30),0
,0:GET(0,0)-(60,60),W,G
120 R=20:B=0:I=0:PI=3.144888:A=P
I*.1
130 PCLS1:SCREEN1,1:CIRCLE(128,9
6),80,0,1:LINE(128,96)-(208,96),
PSET
140 A(I)=RND(R)
150 IFA(I)>R*.5THEN140
160 B=A(I)+B:B(I)=B:R=R-A(I)
170 I=I+1:IFI=7THEN190
180 IF20-B(I-1)>3THEN140
190 A(I)=20-B(I-1)
200 B(I)=20:FORJ=0TOI:B(J)=A*B(J
):C(J)=B(J)-.5*A*A(J):X=80*COS(B
(J)):Y=80*SIN(B(J)):IFJ<I THENLI
NE(128,96)-(128+X,96-Y),PSET
210 X=70*COS(C(J)):Y=70*SIN(C(J)
):X=128+X:Y=96-Y:ON J+1 GOSUB13,
11,10,14,12,8,6,7,9
220 NEXT
230 PUT(98,66)-(158,126),W,AND:*
2:*1:SCREEN1,1
240 K$=INKEY$:IFK$<>CHR$(13)THEN
240ELSE120
```

Listing 4: PAINT 4

```
1 REM *** STAR PAINT ***
      BY H. ALLEN CURTIS
      COPYRIGHT (C) 1985
2 POKE334,158:POKE335,27:POKE336
,110:POKE337,26:POKE401,126:POKE
402,1:POKE403,78
100 PMODE4,1:PCLS1:COLOR0,1:SCRE
EN1,1
110 POKE178,RND(255):PAINT(128,9
6),,0
120 FORI=1TO1999:NEXT
130 C=PEEK(256*PEEK(186)):K=C:PC
LS1:FORI=1TO500:NEXT:*PAINT128,9
6,C,K
140 K$=INKEY$:IFK$<>CHR$(13)THEN
140ELSE100
```

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16K ECB

An interesting graphics display using the lower PMODEs

Amnotron Animation

By Archor Wright

Amnotron is an animation program which uses a form of bi-screen animation. This means it switches back and forth between graphics pages. This is accomplished by having the computer count from one to two, one representing a graphics page (`PMODE 4,1`), and two representing another graphics page (`PMODE 4,5`). When you use higher `PMODE`s, you have to `PCLEAR 8`, and this wastes a lot of memory in 16K.

I used `PMODE 2` in this program to demonstrate that it isn't necessary to use higher `PMODE`s to create bi-screen animation.

If your computer won't use the speed-up `POKE` (`POKE 65495,0`), delete it from the program before running it.

(You may direct questions about this program to the author at 1112 N. Keene Road, Clearwater, FL 33515. Please enclose an SASE when writing.) ☐

Archor Wright is a student at Clearwater High School in Clearwater, Florida. He is an inventor and has served as a volunteer computer counselor.

The listing: `AMNOTRON`

```
0 PCLEAR8:POKE65495,0'CREATED BY
: ARCHOR WRIGHT
1 GOSUB15:GOSUB2:GOSUB15:GOSUB3:
GOSUB15:GOSUB4:GOSUB15:GOSUB3:GO
SUB15:GOSUB2:GOSUB15:GOSUB11:GOS
UB15:GOSUB12:GOSUB15:GOSUB11:GOT
O1
2 GOSUB7:GOSUB5:DRAW"BM=T;,94GDG
D9FDR3U9BU4BR5DFD9GDLU9D10L4UD4R
D2R3U4D15GD3L9HUER4FR2EBL3HU16":
SCREEN1,1:RETURN
3 GOSUB7:GOSUB5:DRAW"BM=T;,94GDG
D9FDR2U5RU4BR4D4LD5R2UEU9HUHBD15
BLL4D3RD2R3U5BRRD4LU4D8RD8GD3L9H
UER4FR2EBL3HU8LU8LD8LD8L4GDFR":S
CREEN1,1:RETURN
4 GOSUB7:GOSUB5:DRAW"BM=T;,94GDG
D9FDRU3RU3RU3BR4D3LD3LD3R3UEU9HU
HBD14BL3DL4UD4RD2R3U6R5D4L2U4D6R
D5RD6GD3L9HUER4FR2EBL3HU6LU5LU3B
L2BU4D6LD5LD6FR2EREBL7BDL4GDFR5"
:SCREEN1,1:RETURN
5 T=236-G:V=234-G:DRAW"BM=V;,80C
4S4ER8F2D9GL2HU6HL5GLHU2EGBF2BDL
```

```
D3RU2RD2UR5L6DG2R3FRLHLD3R2D2R6U
3BM0,130C4R255":PAINT(V+4,80),4,
4:IFG>220THENGOSUB7:GOTO16
6 RETURN
7 Z=Z+1
8 IFZ=1THENPMODE4,1:PCLS1
9 IFZ=2THENPMODE4,5:PCLS1:Z=0
10 RETURN
11 GOSUB7:GOSUB5:DRAW"BM=T;,94GD
GD9FDR4U5LU4BR4D4RD5RU11HUHBD15B
RD5L3U2LU4DR4D5LD3LD7GD3L9HUER4F
R2EBL3HU7RU9LD4BR8FD5RD7GLGL2DL6
FR9U3":SCREEN1,1:RETURN
12 GOSUB7:GOSUB5:DRAW"BM=T;,94GD
GD9FDR5U3LU3LU3BR4D3RD3RD4L4UD4R
D2R3U17HUHBD21LD2LD6GD3L9HUER4FR
2EBL3HU6RU5RU4L2D3RU3BR9D6LD4RD7
GLGL8DFR9U3":SCREEN1,1:RETURN
14 G=G-4:RETURN
15 G=G+4:RETURN
16 FORT=0TO210:GOSUB14:GOSUB11:G
OSUB14:GOSUB12:GOSUB14:GOSUB11:G
OSUB14:GOSUB2:GOSUB14:GOSUB3:GOS
UB14:GOSUB4:GOSUB14:GOSUB3:GOSUB
14:GOSUB2:NEXTT:GOSUB2:PLAY"V31L
35O3AC":LINE(0,0)-(255,131),PRES
ET,BF:POKE178,3:LINE(255,131)-(0
,0),PSET,BF
17 FORT=60TO16STEP-2:GOSUB7:H=T/
2:DRAW"BM194,96C4U=H;E=T;D=T;D=T
;D=T;H=T;U=H;":SCREEN1,1:NEXTT:F
ORT=1TO16:H=17-T:GOSUB7:DRAW"BM1
94,88C4E=H;D=H;D16D=H;H=H;L=T;U1
6R=T;":SCREEN1,1:NEXTT:FORT=178T
O70STEP-4:GOSUB7:DRAW"BM=T;,88C4
R16D16L16U16":SCREEN1,1:NEXT
18 FORT=1TO16:H=17-T:GOSUB7:DRAW
"BM70,88C4R=H;D16L=H;G=T;U=T;U16
U=T;F=T;":SCREEN1,1:NEXTT:FORT=1
TO16:GOSUB7:H=17-T:DRAW"BM54,72C
4D=H;D32U32U=H;R=T;F16L=T;D=H;G1
6":SCREEN1,1:NEXTT:PLAY"V31L99":
FORT=0TO7:PLAY"V-O3FED":NEXTT
19 FORT=0TO5:PLAY"V-02DEC":NEXTT
:FORT=0TO7:PLAY"V-O1GFE":NEXTT:R
UN24
20 Z=Z+1
21 IFZ=1THENPMODE2,1:PCLS
22 IFZ=2THENPMODE2,3:PCLS:Z=0
23 RETURN
24 FORT=1TO62STEP2:GOSUB20:DRAW"
BM=T;,=T;S=T;R2LF2BR2H2FRHF2BR2H
2RLFRLFRBF2BL7RLFRLFRBR2H2RF2BR2
H2RFD":SCREEN1,1:NEXTT:PLAY"L77A
CEDCEDCEDCP2":PCLS1:RUN
```

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END
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FIFTEEN
SIXTEEN
SEVENTEEN
EIGHTEEN
NINETEEN
TWENTY
THIRTY
FORTY
FIFTY
SIXTY
SEVENTY
EIGHTY
NINETY
HUNDRED

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THOUSAND
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FAIL
FAILURE

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GAS
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HOW
JOHN
LAURA
LIKE
LINDA
LISA
MAKE
MEAGAN
MEASURE
MISSING
MODIFY
NAME
NIGHT
NOUN
PEOPLE
PERIOD
PHRASE
PRODUCT

PUT
QUESTION
RACHAEL
RICHARD
SAY
SENTENCE
SINK
SIT
SIGN
SOLVE
SPELL
SQUARE
SPRING
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TOM
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VERB
WOULD
WINTER

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For those needing a custom vocabulary, Speech Systems offers customized speech libraries at the rate of $15 per phrase (5 seconds max.), 10 phrases minimum order. Provide an audio cassette tape with phrases or use our announcer. . . . . Minimum $150.00

SAVE $40
BUY 3
GET ALL 5
Introductory Offer†

*EARS and Disk system required.
†Custom Library not part of introductory offer.

SYMPHONY 12™

A 12 VOICE POLYPHONIC STEREO MUSIC SYNTHESIZER

NEW! 61 NOTE KEYBOARD

$20 OFF

musical applications of microprocessors

- 12 SIMULTANEOUS VOICES
- STEREO & MONO
- 4 NOISE GENERATORS
- SOUND EFFECTS
- PLAYS AND MAKES MUSICA 2 FILES

SUPER POLYPHONIC. Speech Systems is proud to bring you SYMPHONY 12, a polyphonic 12 voice hardware stereo music synthesizer for the Color Computer. SYMPHONY 12 also gives you 4 noise generators for percussion synthesis and sound effects. The PIANO KEYBOARD and MUSICA 2 (sold separately) turns your COCO into a real music machine with incredible flexibility.

STEREO and MONO. By connecting SYMPHONY 12 to your home stereo system, music is produced in stereo, 6 voices from each channel. However, you don't need to have a stereo system, all 12 voices also come out of your TV or monitor.

PICK AN INSTRUMENT. SYMPHONY 12 lets you choose from 10 preset instruments to synthesize chimes, violin, oboe, banjo, harpsichord, piano and more. You can even change instruments as the music plays.

SOUND EFFECTS. SYMPHONY 12 is a sophisticated sound generator. 12 voices and 4 noise generators give you incredible sound effect capability. We have included gun shot, explosion, racing car and more.

WATCH IT PLAY. As SYMPHONY 12 plays, a graphics display of a piano keyboard shows the notes playing. The display is entertaining as well as very educational.

PLAY MUSICA 2 FILES. Thousands of MUSICA 2 users will be excited to know SYMPHONY 12 plays all music developed using MUSICA 2 like you have never Seen or Heard it. In fact we highly recommend the use of MUSICA 2 as a composition development tool for SYMPHONY 12. Use MUSICA 2's superior graphics input capability and then play it through SYMPHONY 12. You can also take advantage of our MUSIC LIBRARY series (sold separately) to give you access to over 500 music pieces representing 20 hours of music.

ULTIMATE MUSIC DEVELOPMENT SYSTEM. SYMPHONY 12, MUSICA 2, and the PIANO KEYBOARD give you incredible flexibility. Imagine sitting down at the PIANO KEYBOARD, playing a piece and recording it as you play just as you would to a tape recorder. Save your masterpiece and then using MUSICA 2 edit it if you like and print it. If you have a MIDI synthesizer, you can take the music and play it using COCO MIDI (sold separately). Try that on an IBM, APPLE, or COMMODORE (good luck).

PIANO KEYBOARD. For those wishing to turn SYMPHONY 12 into a real polyphonic synthesizer we offer the extremely powerful and versatile PIANO KEYBOARD. The PIANO KEYBOARD was deisgned to be used in our entire music product line. You can use it with SYMPHONEY 12, MUSICA 2, SYNTHER 77 PLUS, and even our advanced speech synthesizer, SUPER VOICE.

When using MUSICA 2, you will be using 4 of the 12 voices available from SYMPHONY 12. To take advantage of the full 12 voice capability of SYMPHONY 12 you may use either the Color Computer's keyboard or the PIANO KEYBOARD.

Y-CABLE or MULTI-PAK. Tape users using both SYMPHONY 12 and the PIANO KEYBOARD will require a Y-CABLE. Disk users will require the Triple Y-Cable or MULTI-PAK.

SYMPHONY 12. You get over a dozen music and sound effect selections and complete documentation. Software is shipped on Tape or Disk.

SYMPHONY 12	$79.95
SYMPHONY 12 (with Keyboard order)	$59.95
OPTIONS	
MUSIC LIBRARY (each volume)	$29.95
MUSICA 2	$29.95
PIANO KEYBOARD (61 note)	$129.95

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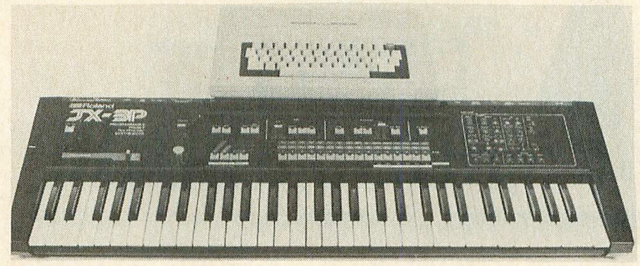
COCO MIDI SEQUENCER/EDITOR

Now your COCO can talk to your MIDI music synthesizer. Whether you have a Korg, Roland, Casio, Yamaha, or Moog, it doesn't matter as long as it's MIDI equipped. Choose from our entry level MUSICA 2 COCO MIDI system that plays MUSICA files or our Professional COCO MIDI SYSTEM.



- Supports up to 16 tracks.
- 2,000 events per track.
- 4,000 events all tracks.
- May be used as a sequencer.
- User friendly graphics display.
- Menu driven.
- Metronome available.
- Real time recording.
- Save your masterpiece to disk.
- Tempo may be modified.
- Quantizing to 32nd or 64th.
- Playback any or all tracks at any tempo.
- Tracks may be deleted, copied, transposed or mixed.
- Filter out unwanted channel or type of MIDI data.
- Simple music editing.
- Requires 64K disk system.
- Transposition.

Comes complete with Rom Pak Hardware interface, cables, manual, and software. Disk users require Y-Cable or Multi-Pak $149.95

Now under development, voicing patch libraries for the Casio CZ series of synthesizers.

CZ-101 USERS!

We offer the CZ-101 CONNECTION and the 61 NOTE PIANO KEYBOARD to turn the 101 into a professional full size synthesizer.

CZ-101 CONNNECTION . $29.95
61 NOTE KEYBOARD . $129.95

MUSICA MIDI™

COCO MIDI takes any MUSICA 2 music file and plays it through your music synthesizer. We offer you over 800 tunes from our MUSIC LIBRARY series (sold separately) or create your own music using the best music composition program available, MUSICA 2 (sold separately).

COCO MIDI includes: documentation, plenty of music, and the cable to connect between the COCO and your synthesizer. . . . . **$39.95** Tape or Disk

MUSIC LIBRARY™

The MUSIC LIBRARY series consists of 8 volumes: 100 through 800 each sold separately. Each contains over 100 four voice music selections with a playing time of over 3 hours each. The disk version is shipped on 5 full disks. When coupled with the STEREO PAK, the music is reproduced with unsurpassed realism.

A JUKEBOX program is included to allow you to select specific songs or automatically play each. These songs are ready to go, you don't need MUSICA 2 or a knowledge of music. MUSICA 2 users may customize each song. Each volume sold separately, specify tape or disk. . . . . **$29.95** Tape or Disk

MUSIC LIBRARY 100

Stage, Screen, & TV
Music of the 70's
Music of the 60's
Music of the 50's
Old Time Favorites
Classical
Christmas (popular)
Christmas (traditional)
Patriotic
Polka Party

MUSIC LIBRARY 200 (another 100 selections)
MUSIC LIBRARY 300 (another 100 selections)
MUSIC LIBRARY 400 (another 100 selections)
MUSIC LIBRARY 500 (another 100 selections)
MUSIC LIBRARY 600 (another 100 selections)
MUSIC LIBRARY 700 (another 100 selections)
MUSIC LIBRARY 800 (another 100 selections)

Entire Library
30 Hours of
Music!
40 disks
or
25 tapes

SYNTHER 77 PLUS

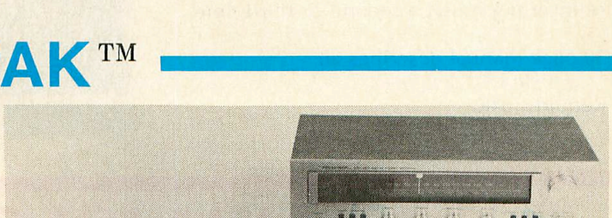
You control vibrato pattern, Bender rate, Volume level as well as Attack, Decay, Sustain, and Release (ADSR envelope). As you play you can record, then edit and save it to disk or tape. You can even fine tune it to match other instruments.

The PIANO KEYBOARD is not necessary, you can use your COCO keyboard but the PIANO KEYBOARD makes your COCO a real music instrument. . . . . . . **$29.95** Disk only

STEREO PAK™

Plug this gem into your computer, connect to your home stereo system and sit back and enjoy music realism. The STEREO PAK is a hardware music synthesizer that plays our MUSIC LIBRARY series and MUSICA 2 music in stereo. Because it was designed specifically with music reproduction in mind, the sound is superb. The highs are crisp and clear while the bass notes will rattle your walls. Internally we use two high performance 8 bit digital to analog converters to assure fidelity.

The STEREO PAK is all hardware. It is intended as an enhancement for MUSICA 2 and our MUSIC LIBRARY series. Disk users will require our Y-CABLE or a MULTI-PAK. **$39.95**



NEW! 61 NOTE PIANO KEYBOARD

ATTENTION CZ-101 OWNERS

Our new 61 note (5 octave) full size keyboard is perfect for the beginner or professional. To give the PIANO KEYBOARD the most flexibility, we give you a choice of 5 different products to use: **SYMPHONY 12, MUSICA 2, SYNTHER 77 PLUS, SUPER VOICE, and the CZ-101 CONNECTION.**

The PIANO KEYBOARD and **SYMPHONY 12** turns the COCO into a 12 voice music synthesizer. When used with **MUSICA 2**, the PIANO KEYBOARD provides a user-friendly means of inputting music. For those wishing control over Vibrato, Volume, Bender, as well as Attach, Decay, Sustain, and Release (ADSR), we offer **SYNTHER 77 PLUS**, a monophonic synthesizer. **SUPER VOICE**, COCO's most advanced speech synthesizer, doubles as a music synthesizer when used with the PIANO KEYBOARD. For those with the Casio CZ-101 music synthesizer, the **CZ-101 CONNECTION** allows you to connect the "full size" PIANO KEYBOARD to give you standard keyboard.

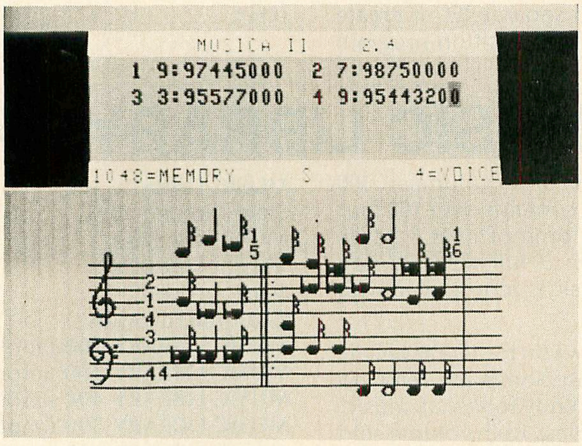
61 NOTE PIANO KEYBOARD	**$129.95**
CZ-101 CONNECTION	**$ 29.95**

MUSICA 2

$29.95

Tape or Disk

- When in stereo mode, music is played through our STEREO PAK (purchased separately).
- Loudness of each voice may be individually specified.
- Memory available is constantly displayed.
- Voice waveshapes may be exchanged between voices at any point.
- Tempo may be specified and may even be altered as the music plays.
- Flats and sharps supported.
- Billions of timbre combinations.
- High resolution graphic display, looks just like sheet music.
- MUSICA 2 is 100% software, no need for hardware unless you want music produced in STEREO. In that case, the STEREO PAK may be purchased separately. It's a must for the audiophile!
- Repeat bars allow repeating of music without re-inserting music a second or third time.
- 30 page manual describes all.
- Requires 64K.

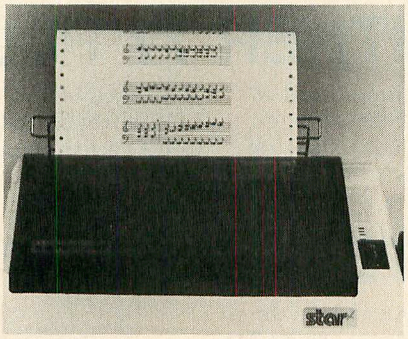


```
          MUSICA II      2.4
   1 9:97445000  2 7:98750000
   3 3:95577000  4 9:95443200

1048=MEMORY        3        4=VOICE
```

- Output music to your printer (Gemini 10X, Epson, R.S. printers).

- Allows you to specify key signature.
- Voice timbre (waveshape) may be altered by specifying harmonic content just like stops on an organ.
- During editing, voice being inserted is displayed.
- Each measure is numbered for easy reading of music.
- Measure bars aid in reading and developing music.
- Each voice may be visually highlighted for easy identification.
- 4 Voices produced simultaneously.
- Input notes from Coco keyboard, joystick, or Piano Keyboard.



- Play music from your own BASIC program.
- Block copy music for easy music development.
- 100% machine language so it is lightning fast.
- Vibrato effect easily produced.
- With STEREO PAK, voices may be switched between left and right speakers as music plays.
- Durations include: whole, half, quarter, eighth, sixteenth, thirty-second, sixty-fourth, and triplet.

MUSIC THEORY

COURSE 1

This course covers all the basics from music notation & duration, key signatures, tempo, to an introduction of the keyboard. This is an entry level course recommended as a prerequisite for Course 2. 32K Disk only **$49.95**

COURSE 2

A more advanced course that deals with: Major and Harmonic Minor scales, interval spelling, Triad (Chord) theory, Inversions, Dominant 7th chords, and ear training of the intervals. 32K Disk only . **$49.95**

'SUPER VOICE' T.M.

COCO'S MOST ADVANCED SPEECH SYNTHESIZER.

IT TALKS, SINGS AND MORE.

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WITH EARS PURCHASE

only . . . $59.95

musical applications of microprocessors

SUPER VOICE is no ordinary speech synthesizer. It uses Silicon Systems, Inc. SSI-263, the most advanced speech/sound chip available. SUPER VOICE is not only capable of highly intelligible speech, sound effects, and singing over a 6 octave range, but now we have turned SUPER VOICE into a monophonic Super Music Synthesizer with our PIANO KEYBOARD.

IT TALKS. A free TRANSLATOR text-to-speech program makes writing your own talking program as easy as SAYING "HELLO."

SUPER VOICE works in any 32K or 64K computer. A disk system requires a Y-Cable or Multi-Pak.

FREE "REACTION" To Test Your Reflexes

FREE SUPER VOICE SINGS THE STAR SPANGLED BANNER

FREE "SIMON" To Test Your Memory

Here are the facts; the decision is yours.

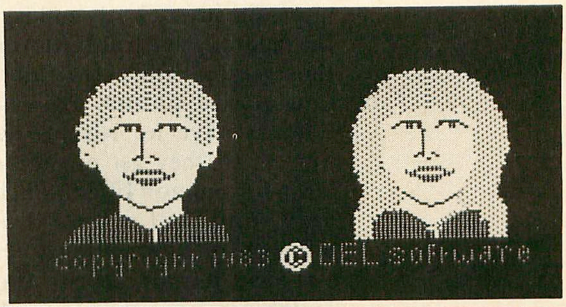
	SUPER VOICE	REAL TALKER	RS SPEECH CARTRIDGE	VOICE-PAK
Synthesizer Device	SSI-263	SC-01	SP-256	SC-01
Speaking Speeds	16	1	1	1
Volume Levels	16	1	1	1
Articulation Rates	8	1	1	1
Vocal Tract Filter Settings	255	1	1	1
Basic unit of Speech	64 phonemes 4 durations each	64 phonemes	64 allophones 5 pause lengths	64 phonemes
Pitch Variations	4096 (32 absolute levels with 8 inflection speeds)	4	1	4

SAVE $24.95

FREE

SUPER TALKING HEADS

Paul and Pauline, our talking heads program is normally $24.95. Until Sept. 15 we will include them with each SUPER VOICE order.



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CALL ANY DAY TO ORDER. ALSO ORDER BY MAIL OR BBS.

If you have problem tenants and they've gotten out of hand, you need to call . . .

The Evictor

By Paul Jensen

When the landlords can't get non-paying (or other) tenants out of the building they call you . . . the Evictor.

Your job is to push the tenants out the building's windows. (No more Mr. Nice Guy!) To do this, you (the white block) move the joystick left and right to push the tenants (which are blue) off the floor they are on. For every floor they fall, you get 50 points. However, these tenants have no wish to leave their homes, so they get out the old mega-laser-ray-cannon rifles (which, remarkably, only kill evictors) and shoot everywhere, hoping to get you.

These tenants know they are no match for you, therefore, they try to escape by descending to the ground floor. If one of the tenants reaches it, he unlocks the front door, lets everyone else out and you lose the game.

Being the disrespectful creatures they are, they prefer to descend by burning a hole in the floor to get to the one below. Whenever this occurs, it costs you 25 points, plus the 50 points lost for not being able to pitch them out of a higher window.

Needless to say, you prefer to take the elevator, which is located in the middle of the building. To use it, just walk onto it and point the joystick up or down.

At the top of the screen, a bonus clock ticks away. After you have disposed of all 10 tenants, you are given 10 points for each bonus point, and are then transported to yet another building to do some landlord's dirty work.

When you lose the three evictors, the game ends. If your score is in the top 10, you are asked for your initials. The 10 best scores (stored in the file TOPTEN/EVC) are saved with each game. The whole score save routine is located at Line 50000 and I would be happy if anyone else would like to use it with their own games.

To load the game, just type it in and save it on a disk. Then RUN it. It asks if your computer can use the speed-up POKE. Answer 'Y' or 'N' accordingly. Then it asks if you want to initiate the TOPTEN/EVC file. If this is the first run, answer with YES. This step only has to be taken once. What it does is erase the high scores on the disk.

After these two questions are answered, a title screen appears. Then, after a key is pressed, the building shows up, and some comments scroll at the bottom of the screen. (The graphics in *Evictor* are in SET/RESET format. I wanted to make the game in machine language but I haven't yet found a good ML random number routine. Does anyone know of one?).

Press a key again. You'll hear a few bars of *Basin Street Blues*, and you're off to the races.

I think this game could be used on a cassette system if the high score saving function was removed.

I hope you enjoy *Evictor*, and may you never get zapped by an ornery tenant.

(You may contact the author at Box 1035, Forest, Ontario, Canada N0N 1J0, phone 519-873-4173. Please enclose an SASE when writing.) ☐

Paul Jensen lives in Forest, a small town in Ontario, Canada. He is 15 years old and enjoys playing the guitar and computer programming.

The listing: EVICTOR

150	83
240	83
430	116
650	8
760	59
980	5
END	76

```
1 REM ************************
2 REM *                      *
3 REM *    E V I C T O R     *
4 REM *                      *
5 REM *    BY PAUL JENSEN    *
6 REM *    FEBRUARY 1986     *
7 REM *                      *
8 REM *    BASIN STREET      *
9 REM *    BLUES WRITTEN BY  *
10 REM*    SPENCER WILLIAMS  *
11 REM*    ARRANGED BY JOHN  *
12 REM*    EDMONDSON         *
13 REM*                      *
14 REM************************
100 CLEAR1500
110 CLS:INPUT"CAN YOUR COMPUTER
HANDLE THE    SPEED-UP POKE";A$:
IF LEFT$(A$,1)="Y" THEN HI=65495
:LO=65494 ELSE HI=32768:LO=32768
 ' POKE WHERE IT WON'T HURT ANYT
HING
120 INPUT"INITIATE 'TOPTEN/EVC'
FILE? TYPE'YES' IF YOU WANT TO";
A$:IF A$="YES" THEN GOSUB50000
130 CLS0:ZZ=1:NN$="EVICTOR"
140 FORT=1030TO1284:POKET-1,128:
POKET,207:POKET+4,128:POKET+5,17
5:CC=CC+1:IFCC=32 THEN CC=0:POKE
T-1,ASC(MID$(NN$,ZZ,1))AND191:ZZ
=ZZ+1
150 NEXT
160 POKET-1,128:POKET+4,128:PRIN
T@40,"BY PAUL JENSEN";:PRINT@72,
"FEBRUARY 1986";:PRINT@136,"PRES
S ANY KEY.";
170 IFINKEY$=""THEN170
180 POKEHI,0
190 D$=STRING$(28,32)+"*** EVICT
OR ***   BY PAUL JENSEN   BOX 10
35 FOREST, ONTARIO, CANADA N0N
1J0   DEVELOPED IN FEBRUARY OF 1
986 FOR THE RAINBOW.  USE THE RI
GHT JOYSTICK TO PLAY. PRESS ANY
KEY TO START GAME."+STRING$(32,3
2):L=1058:EL$=STRING$(2,220)
200 MG(1)=&HCB:MG(2)=&HCF:MG(3)=
&HC7:EL=79:BL$=STRING$(2,128):LL
=3
210 CLS0
220 CO=0:FORT=66TO482STEP64:PRIN
T@T,STRING$(28,140);:NEXT:PRINT@
480,STRING$(2,239);:POKE1534,239
:POKE1535,239:FORT=79 TO 482STEP
64:PRINT@T,STRING$(2,128);:NEXT:
PRINT@EL,EL$;:BN=50:IF P1=0 THEN
 GOTO720
230 FORT=1TO10
240 D=RND(512)+1023:IF PEEK(D+32
)<>140 OR PEEK(D+1)=175 OR PEEK(
D-1)=175 OR D>=1442 THEN 240 ELS
E D(T)=D:POKE D,175:NEXT
250 GOSUB1050
260 TN=TN+1:IF TN=11 THEN TN=1
270 IF D(TN)=0 THEN 260
280 POKEL,207
290 JS=JOYSTK(0)
300 IF JS<5 THEN DI=-1 ELSE IF J
S>58 THEN DI=1 ELSE DI=0
310 POKEL,MG(DI+2)
320 IF PEEK(L+32+DI)=140 OR PEEK
(L+32+DI)=&HDC THEN POKEL,128:L=
L+DI
330 IF PEEK(L+DI)=175 THEN 660
340 POKEL,&HCF
350 IF PEEK(L+32)<>&HDC THEN 380
ELSE JS=JOYSTK(1)
360 IF JS>58 AND EL<>463 THEN PR
INT@EL,BL$;:POKEL,128:L=L+64:EL=
EL+64:PRINT@EL,EL$;:POKEL,207
370 IF JS<5 AND EL<>79 THEN PRIN
T@EL,BL$;:POKEL,128:EL=EL-64:L=L
-64:PRINT@EL,EL$;:POKEL,207
380 REM
390 REM *** MOVE TENANTS ***
400 T=D(TN)
410 DI=RND(3)-2
420 IF PEEK(T+32+DI)=128 THEN DI
=0
430 POKET,128:T=T+DI:POKET,175
440 REM *** LANDLORD RAY ***
450 IF RND(5)<>1 THEN 540
460 IF RND(2)=1 THEN DI=-1 ELSE
DI=1
470 RY=T
480 RY=RY+DI:IF PEEK(RY)=128 THE
N POKERY,188
490 IF ZP=0 THEN IF RY=L THEN ZP
=1 ELSE ZP=0
500 IF PEEK(RY+32)=140 THEN 480
510 IF PEEK(RY)=188 THEN POKERY,
128
520 RY=RY-DI:IF RY<>T THEN 510
530 IF ZP THEN 740
540 REM *** BURN HOLE IN FLOOR
550 IF T>=1442 THEN 1060
```

```
560 IF RND(15)<>1 THEN 610
570 POKET+32,128:POKET,128:T=T+3
2:POKET,175:FORDL=1TO100:NEXTDL:
POKET,128:T=T+32:POKET,175
580 SC=SC-25:IF SC<0 THEN SC=0
590 GOSUB730
600 POKET-32,140
610 REM
620 BC=BC+1:IF BC=5 THEN BC=0:BN
=BN-1:IF BN<0 THEN BN=0:
630 PRINT@10,USING"BONUS ###";BN
;
640 D(TN)=T
650 GOTO260
660 TE=L+DI:FORT=1TO 10:IF D(T)=
TE THEN 670 ELSE NEXT:GOTO260
670 POKE TE,128:TE=TE+DI:POKETE,
175
680 IF PEEK(TE+32)<>128 THEN D(T
)=TE:GOTO 260
690 IF PEEK(TE+64)=140 THEN POKE
TE+32,128:TE=TE+32:POKETE,175:FO
RDL=1TO100:NEXTDL:POKETE,128:TE=
TE+32:POKETE,175:D(T)=TE
700 POKETE,128:TE=TE+32:POKETE,1
75:SC=SC+25:GOSUB730:IF PEEK(TE+
32)<>239 THEN 700 ELSE POKETE,12
8:D(T)=0:SC=SC+25:GOSUB730:CO=CO
+1:IF CO=10 THEN 1040
710 GOTO260
720 FORT=1 TO LEN(D$)-31:PRINT@4
83,MID$(D$,T,26);:FORDL=1TO15:IF
 INKEY$="" THEN NEXTDL,T:GOTO720
 ELSE PRINT@483,STRING$(26,128);
:GOSUB730:GOTO230
730 PRINT@483,USING"SCORE ##,###
  LANDLORDS # ";SC;LL;:RETURN
740 FORDL=1TO50:POKEL,128:POKEL,
207:NEXT
750 FORT=1TO10:PRINT@483,"  ****
* YOU BURN!! *****  ";:FORDL=1TO
100:NEXTDL::PRINT@483,STRING$(26
,128);:FORDL=1TO100:NEXTDL:NEXT
760 ZP=0
770 LL=LL-1:IF LL>-1 THEN GOSUB7
30:GOTO260
780 PRINT@235,"GAME OVER";
790 PLAY"V15T3L4CDCL1D#
800 FORDL=1TO1000:NEXTDL
810 POKELO,0
820 FORDL=1TO500:NEXTDL
830 CLS:PRINT"YOUR SCORE WAS"SC
840 OPEN"I",#1,"TOPTEN.EVC"
850 FORT=1TO10:INPUT #1,I$(T),S(
T):NEXT:CLOSE#1
860 FORT=1TO10:IF S(T)>SC THEN N
EXT:GOTO960
870 PRINT"YOUR SCORE PLACES #";T
880 A$="***"
890 PRINT"ENTER INITIALS:"
900 FORG=1TO3
910 PRINT@340,A$;
920 Z$=INKEY$:IFZ$=""THEN920
930 MID$(A$,G,1)=Z$:NEXTG
940 PRINT@340,A$;
950 FORF=10TO T STEP-1:I$(F)=I$(
F-1):S(F)=S(F-1):NEXT:S(T)=SC:I$
(T)=A$
960 PRINT@480,"PRESS <ENTER> TO
SEE HI SCORES";
970 IFINKEY$<>CHR$(13)THEN970
980 CLS:PRINT"  *** BEST SCORES
TO DATE ***"
990 PRINT
1000 FORT=1TO10:PRINTUSING"## %
% ###,###";T;I$(T);S(T):NEXT:PRI
NT:PRINT"PRESS <ENTER>"
1010 IFINKEY$<>CHR$(13)THEN1010
1020 OPEN"O",#1,"TOPTEN.EVC"
1030 FORT=1TO10:WRITE#1,I$(T),S(
T):NEXT:CLOSE#1:RUN190
1040 FORF=BN TO 0STEP-1:SC=SC+10
:PRINT@10,USING"BONUS ###";F;:GO
SUB730:PLAY"T50CEG":NEXTF:P1=1:L
=1058:EL=79:GOTO210
1050 PLAY"O2T4L8.FL16FL8.DL16DL4
E-L8EL4.FP2P4L4FL8.B-L16B-L8.A-L
16GL8FL4.GP2P4L4FL4.B-L8B-L4A-A-
GL8GL8G-L2G-P8L8B-L8.A-L16GL8.FL
16DL8E-L16EL8FL4D-L4.O-B-O+P4":R
ETURN
1060 PLAY"V31":FORS=1TO10:POKED(
S),128:PLAY"T10CE-GV-V-V-":NEXTS
:GOTO780
50000 REM ***** INITIATE FILE **
***
50010 PRINT"INITIATING TOPTEN/EV
C...":OPEN"O",#1,"TOPTEN.EVC":FO
RT=1TO10:WRITE#1,"***",0:NEXT:CL
OSE#1:RETURN
```

One-Liner Contest Winner . . .

This program accepts your input and then produces the integer factors of that number. For larger numbers, you might try the speed-up POKE (POKE 65495,0). To end the speed-up mode, enter POKE 65494,0.

The listing:

```
0 CLS:Z=44539:INPUT"NUMBER";A:PR
INT"YOUR FACTORS:":FORB=1TOA:C=A
/B:IFC<B THENPRINT"HIT<ENTER>":E
XECZ:RUNELSEIFC<>INT(C)THENNEXTE
LSEPRINTB;C;"/";:NEXTELSEPRINT"H
IT<ENTER>":EXECZ:RUN
```

Chinarut Ruangchotvit
Ramsley, NJ

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book of Simulations* and its companion *The Rainbow Simulations Tape*.)

Introducing

CoCo Max™ II

> There is absolutely nothing else on the Color Computer that is comparable to CoCo Max's power and ease of use. The most enjoyable time with a computer I ever had.
> ***- Computerware Review May 1985***

> CoCo Max is the most incredible product ever marketed for the CC. No review can do it justice. I've never given any product a 10...I give Colorware's CoCo Max (Hardware, Software and Documentation) a 10!
> ***- Color Chronicle Vol III #6***

> I never expected to see anything like it on my CoCo screen. There isn't a single command to remember. Even a person who has no drawing ability like myself can create a presentable picture. I've spent hours just doodling enjoying all the things from silly to the serious. Fascinating experience. Buy it, you won't be sorry.
> ***- 6809 Express May 1985***

> An outstanding program that almost turns your CoCo into a replica of the Macintosh. Terrific hi-res color, very easy to learn and use.
> ***- Family Computing February 1986***

> CoCo Max puts fun back into computing, offering a state of the art environment you find on much more expensive machines. Colorware has invested the kind of time and research that virtually secures its success, and that shows up on your screen.
> ***- Hot CoCo July 1985***

> The pack is well constructed, the user's manual is complete with illustrations and well organized. An outstanding buy for the performance. Colorware's advertisement accurately describes the product. Their delivery was timely as promised.
> ***-Rainbow June 1985***

These were reviews of CoCo Max I. CoCo Max II will blow your socks off with even more power!

- New bidirectional shrink and stretch
- New rotate function
- 9 new fonts (for over 200 typestyles)
- A new "Glyphic font" of small pictures
- A 68 page scrapbook
- Point and click to load files (no typing)
- Full error reporting, crash proof
- Custom patterns can be saved
- Printing in color (with CGP 115 or 220)
- Much more. (Note: CoCo Max II is available on disk only)

The reviews are nice, but see it for yourself* and draw your own conclusion.

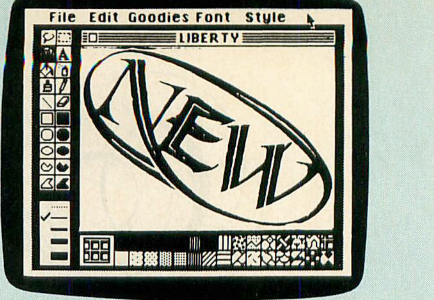
*If you are not delighted with your CoCo Max II, we will immediately refund your purchase, including postage back.

COLORWARE

Call Toll Free 800-221-0916.

For more information on CoCo Max, turn the page.

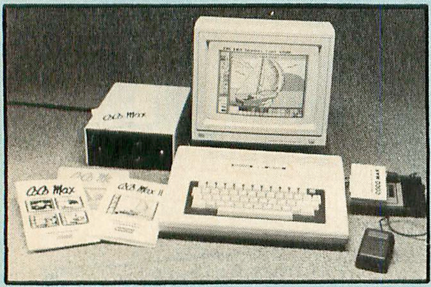
CoCo Max™ II



You'll use it all the time and love using it.

What is CoCo Max?

Simply the most incredible graphic and text creation "system" you have ever seen. A Hi-Res Input Pack (more on the pack later) is combined with high speed machine language software. The result will dazzle you.



CoCo Max disk system, with Y-cable.

Is CoCo Max for you?

Anyone who has ever held a pencil or a crayon for fun, school or business will love it. A 4 year-old will have fun doodling, a 15 year-old will do class projects and adults will play with it for hours before starting useful applications (illustrations, cards, artwork, business graphics, flyers, charts, memos, etc.) This is one of the rare packages that will be enjoyed by the whole family.

What made CoCo Max an instant success?

First there's nothing to learn, no syntax to worry about. Even a child who can't read will enjoy CoCo Max. Its power can be unleashed by simply ***pointing*** and ***clicking*** with your mouse or joystick. With ***icons*** and ***pull down menus,*** you control CoCo Max intuitively; it works the same way you think.

Don't be misled by this apparent simplicity. CoCo Max has more power than you thought possible. Its blinding speed will astound you.

It lets you work on an area 3.5 times the size of the window on the screen.

It's so friendly that you will easily recover from mistakes: The ***undo*** feature lets you revert to your image prior to the mistake. As usual, it only takes a single click.

Later, we will tell you about the "typesetting" capabilities of CoCo Max II, but first let's glance at a few of its graphic creation tools:

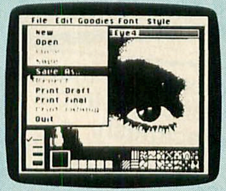
With the ***pencil*** you can draw free hand lines, then use the ***eraser*** to make corrections or changes. For straight lines, the convenient ***rubber-banding*** lets you preview your lines before they are fixed on your picture. It's fun and accurate. Lines can be of any width and made of any color or texture.

The ***paint brush,*** with its 32 selectable brush shapes, will adapt to any job, and make complicated graphics or calligraphy simple.

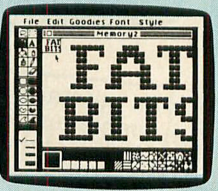
For special effects, the ***spray can*** is really fun: 86 standard colors and textures, all available at a click. It's like the real thing except the paint doesn't drip.

CoCo Max will instantly create many shapes: circles, squares, rectangles (with or without rounded corners), ellipses, etc. Shapes can be filled with any pattern. You can also add hundreds of custom patterns to the 86 which are included.

The ***Glyphics*** are 58 small drawings (symbols, faces, etc.) that can be used as rubber stamps. They're really great for enhancing your work without effort.



Pull down menus



Zoom in!

Control Over Your Work

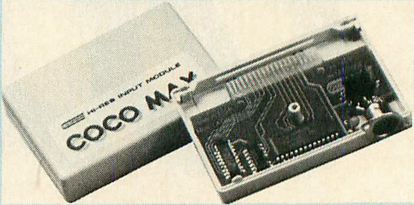
CoCo Max's advanced "tools" let you take any part of the screen, (text or picture) and perform many feats: • You can move it around • Copy it • Shrink or enlarge it in both directions • Save it on the electronic ***Clipbook*** • Flip it vertically or horizontally • Rotate it • Invert it • Clear it, etc. etc.

All this is done instantly, and you can always ***undo*** it if you don't like the results.

For detail work, the ***fat bits*** (zoom) feature is great, giving you easy control over each pixel.

To top it all, CoCo Max II works in color. Imagine the pictures in this ad in color. If you own a Radio Shack CGP-220 or CGP-115, you can even print your work in full color!

There is so much more to say, such as the capability to use CoCo Max images with your BASIC programs, the possibility to use CoCo Max's magic on any standard binary image file. There are also many advanced features such as the incredible ***lasso***.



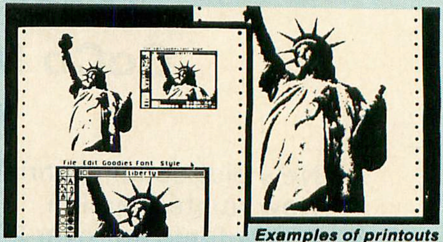
Inside the Hi-Res Input Pack

Why a Hi-Res Input Pack?

Did you know that the CoCo joystick input port can only access 4096 positions (64x64)? That's less than 10% of the Hi-Res screen, which has 49152 points! (256x192). You lose 90% of the potential. The Hi-Res Input Pack distinguishes each of the 49152 distinct joystick or mouse positions. That's the key to CoCo Max's power. The pack plugs into the rom slot (like a rom cartridge). Inside the pack is a high speed multichannel analog to digital converter. Your existing joystick or mouse simply plugs into the back of the Hi-Res Pack.

Electronic Typesetting...

You'll be impressed with CoCo Max's capability. Text can be added and moved around anywhere on the picture. (You can also rotate, invert and flip it...) At a click, you can choose from 14 built in ***fonts*** each with 16 variations. That's over 200 typestyles!


File Edit Goodies Font Style
Liberty

Examples of printouts

Printing Your Creations

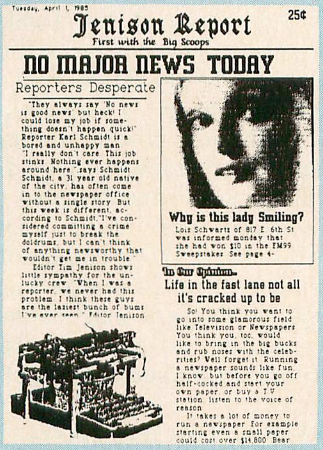
There are a dozen ways to print your work. All are available with a click of your joystick (or mouse) without exiting CoCo Max. Your CoCo Max disk includes drivers for over 30 printers!

All the CoCo Max pictures are **unretouched** screen shots or printouts (Epson RX-80).

CoCo Max II™

The whole family will enjoy CoCo Max. Here are a few examples of the possibilities.

All these pictures are **unretouched** screen photos or printouts (on an Epson RX-80).


Tuesday, April 1, 1985

Jenison Report 25¢

First with the Big Scoops

NO MAJOR NEWS TODAY

Reporters Desperate

"They always say 'No news is good news' but heck! I could lose my job if something doesn't happen quick!" Reporter Karl Schmidt is a bored and unhappy man "I really don't care This job stinks. Nothing ever happens around here." says Schmidt Schmidt, a 31 year old native of the city, has often come in to the newspaper office without a single story But this week is different, according to Schmidt."I've considered committing a crime myself just to break the doldrums, but I can't think of anything newsworthy that wouldn't get me in trouble."

Editor Tim Jenison shows little sympathy for the unlucky crew "When I was a reporter, we never had this problem. I think these guys are the laziest bunch of bums I've ever seen." Editor Jenison

Why is this lady Smiling?

Lois Schwartz of 817 E 6th St was informed monday that she had won $10 in the FM99 Sweepstakes See page 4-

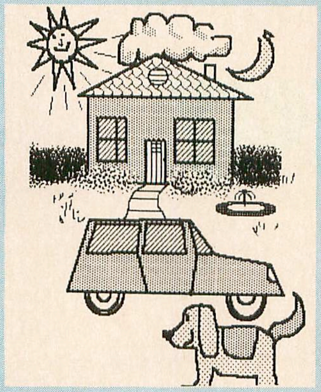
In Our Opinion..

Life in the fast lane not all it's cracked up to be

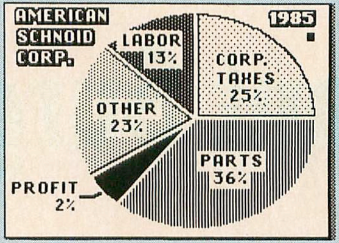
So! You think you want to go into some glamorous field like Television or Newspapers You think you, too, would like to bring in the big bucks and rub noses with the celebrities? Well forget it Running a newspaper sounds like fun, I know, but before you go off half-cocked and start your own paper, or buy a T.V station listen to the voice of reason

It takes a lot of money to run a newspaper For example starting even a small paper could cost over $14,800 Bear

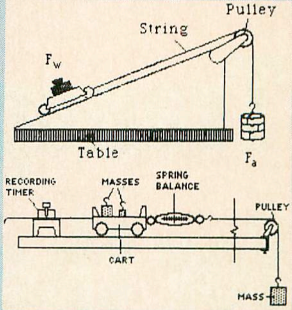
① *Publish a newsletter or bulletin*



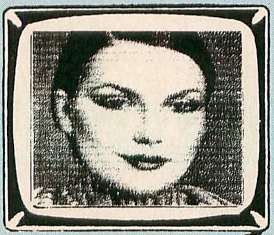
② *Fun for children while stimulating creativity.*



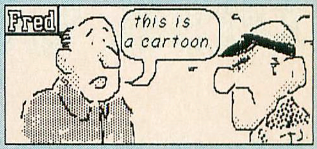
③ *Business graphs, charts, diagrams. Also memos*



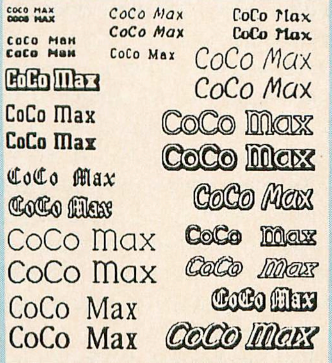
④ *Junior's homework and science projects. Term papers too!*



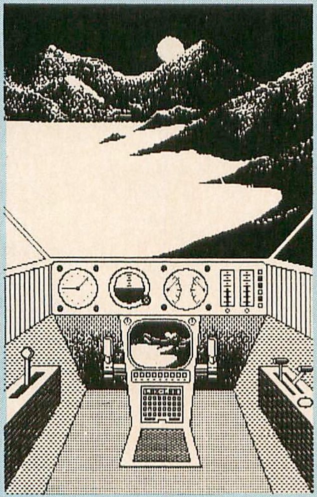
⑦ *Video portrait (with optional digitizer).*



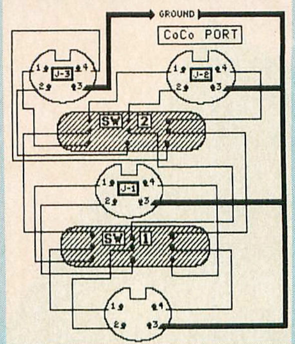
⑧ *This is a cartoon.*



⑤ *Over 200 typestyles to choose from! generate flyers.*



⑥ *A new way to express your imagination.*



⑨ *schematics and floor plans.*

CoCo Max II
CoCo Max II
CoCo Max II
CoCo Max II

⑩ *Logos and letterheads.*

System Requirements:

Any 64K CoCo and a standard joystick or mouse. (The koala pad and the track ball work, but are not recommended.)
Disk systems need a Multi-Pak or our Y-Cable.
CoCo Max is compatible with any Radio Shack DOS and ADOS.
Note: the tape version of CoCo Max includes almost all the features of CoCo Max II except *Shrink, Stretch, Rotate,* and *Glyphics.* Also, it has 5 fonts instead of 14.
CoCo Max is not compatible with JDOS, DoubleDOS, MDOS, OS-9, the X-pad, and Daisy Wheel Printers.

Printers Supported:

Epson MX, RX, FX and LX series, Gemini, Star, Micronix, Delta 10, 10X, 15, 15X, SG-10,Okidata 82A, 92, 93, C. Itoh Pro-writer, Apple Image-writer, Hewlett-Packard Thinkjet, Radio Shack DMP 100, 105, 110, 120, 200, 400, 500, Line Printer 7, Line Printer 8, TRP-100, CGP-220. (DMP-130 use Line Printer 8), PMC printers, Gorilla Banana.
Color printing: CGP-200, CGP-115

Pricing

CoCo Max on tape with Hi-Res Pack and manual.	$69.95
CoCo Max II (disk only) with Hi-Res Pack and manual.	$79.95
Upgrade: CoCo Max to CoCo Max II New disk and manual New features of CoCo Max II: 14 fonts and glyphic font, dynamic shrink and stretch, rotate, multiple drive capability, 68 page scrapbook, point and click file load, color printer drivers, full error reporting.	$19.95
Upgrade: CoCo Max tape to disk manuals, disk and binder	$24.95
Y-Cable: *Special Price*	$19.95
Super Picture Disks #1, #2, and #3 each:	$14.95
All three picture disks	$29.95

Guaranteed Satisfaction
Use CoCo Max for a full month.
If you are not delighted with it,
we will refund every penny.

Font Editor Option

A font is a set of characters of a particular style. CoCo Max includes 15 fonts. You can create new fonts of letters, or even symbols or graphics with the font editor. Examples: set of symbols for electronics, foreign alphabets, etc. $19.95

Video Digitizer DS-69

This new Low Cost Digitizer is the next step in sophistication for your CoCo Max system. With the DS-69 you will be able to digitize and bring into CoCo Max a frame from any video source: VCR, tuner, or video camera. Comes complete with detailed manual and C-SEE software on disk. Multi-Pak is required.

New Low Price Save $50........ $99.95
New: faster DS-69A.......... $149.95

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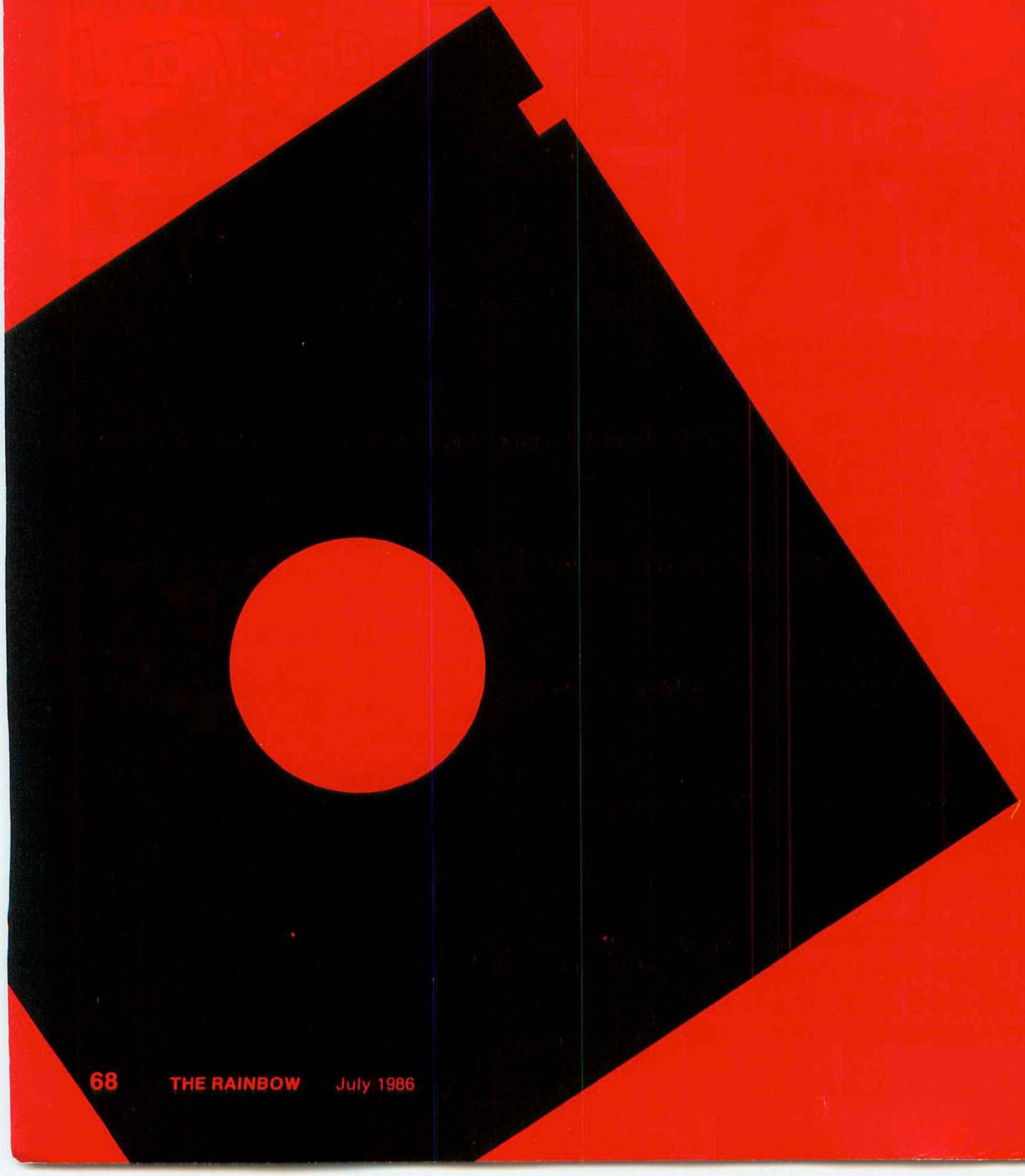
Transplant Surgery for the Disk Controller

By Kerry M. Armstrong



The CoCo disk controller manufactured by Tandy/ Radio Shack Corporation contains a 24-pin ROM chip in which Disk BASIC, a very simple disk operating system, resides. Better disk operating systems for the CoCo have been designed by individuals and third party vendors. These DOSs can usually be customized to utilize such things as 40-track and double-sided drives, faster step rates, additional commands and/or utilities, etc.,

While most of these tasks can be accomplished with the use of short machine language programs or POKEs, they generally must be loaded and executed every time the computer is turned on or Reset, and are often not worth the trouble to use. However, if these same patches could be placed permanently into ROM with the DOS, then they would be present at every startup of the computer. Using an Erasable Programmable Read Only Memory, EPROM, they can be permanently installed. nently installed.

The pin-for-pin EPROM available for the 24-pin DOS socket on the disk controller board is the 68764 or 68766. These cost about $40 new and $20 used. (Because EPROMs are erasable, they can be erased, programmed and used many times.) However, there does exist a series of EPROMs (2764 and 27128) that can be utilized. They sell new for about $3.50 and $4.50, respectively, and can often be obtained for about $1.50 used. The only drawback is that these

---

Kerry Armstrong, an assistant district attorney, is considered a leading authority among Texas prosecutors on the creation and computerization of worthless check systems, and has written extensively on the subject. He also writes both the newsletter for the Fort Worth Color Computer Users' Group and CoCo, a monthly column on a regional videotext service.

are 28-pin chips and thus are not pin-for-pin compatible with the 24-pin socket on the disk controller board, which means you can't just pluck out the old DOS-ROM and stick one of these in its place.

In the February 1985 issue of RAINBOW, instructions were provided for the modification of a 28-pin EPROM and a 28-pin chip socket that, when wired together, could be plugged directly into the 24-pin RS-DOS socket. (See "Cooking With CoCo," by Colin J. Stearman, Page 146.) This method is an effective way to adapt a 2764 EPROM to be used in the disk controller, and does have the advantage that you may always pull the EPROM/ADAPTER out of the socket and put the old disk back in.

On the other hand, this method also has a couple of distinct disadvantages. First, the adapter method requires that you do some soldering directly to some of the EPROM pins, which could, if you're not careful, result in damage to the EPROM. Secondly, the adapter method does not allow you to take advantage of nearly 8K additional memory space that is available in the DOS area and could be utilized for additional DOS commands and/or in ROM utilities.

The 2764 is an 8K EPROM and would occupy memory locations &HC000 to &HDFFF, as does Disk BASIC. Memory locations &HE000 to &HFEFF are wasted space on the CoCo (about 8K). This space contains a mirror image of Disk BASIC.

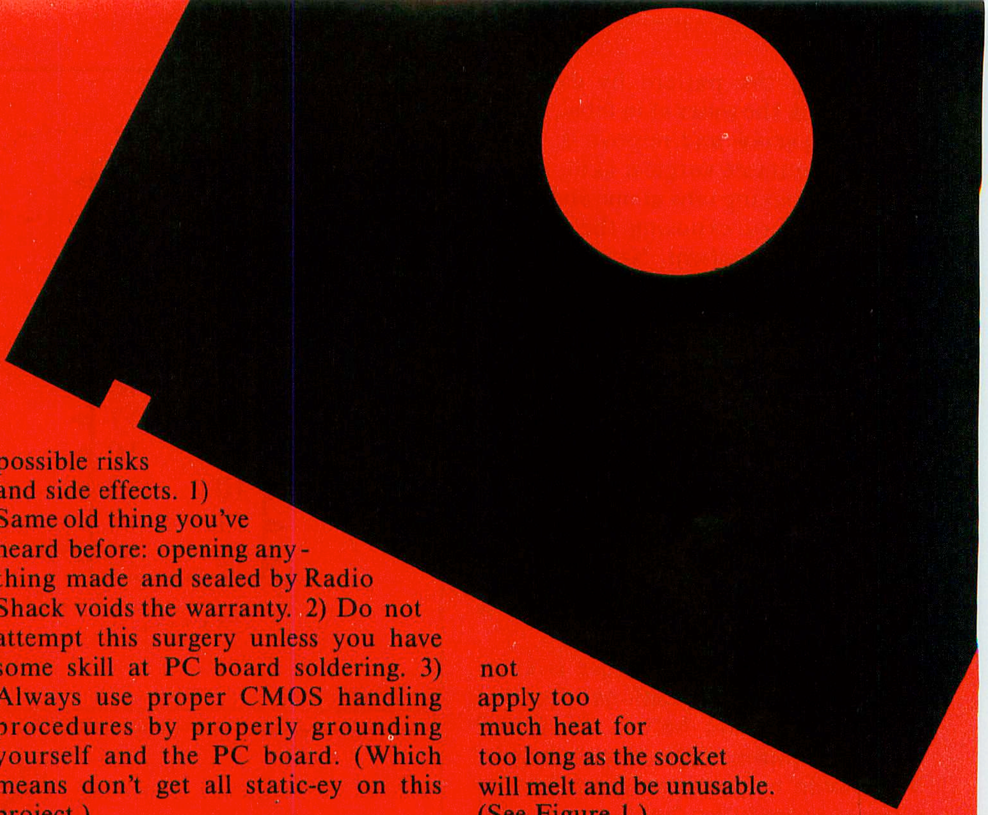
The 27128 is a 16K EPROM and the additional memory can be utilized by it. However, it will not work properly in the adapter because there is no access line to the upper 8K of memory in the 27128.

In light of this diagnosis, we come to the purpose of this treatise, that of doing a permanent surgical transplant modification on the RS-Disk Controller so that 2764 and 27128, 28-pin EPROMs, may be used.

(NOTE: Tandy/Radio Shack has marketed three different CoCo disk controllers to date. With the manufacture of the second and third controller board, they have left off several of the "lands." The third and newest type of controller board does not have the necessary land to access the upper 8K on a 27128 EPROM. The required land is number 37 as indicated in Figure 3.)

Risk Disclosures

A good surgeon always warns of the possible risks and side effects. 1) Same old thing you've heard before: opening anything made and sealed by Radio Shack voids the warranty. 2) Do not attempt this surgery unless you have some skill at PC board soldering. 3) Always use proper CMOS handling procedures by properly grounding yourself and the PC board. (Which means don't get all static-ey on this project.)



The Transplant Surgery

Let's get down to the business of doing a socket transplant on the disk controller. We need some wire-wrap wire (RS# 278-501) and the all important 28-pin socket. There are three types of 28-pin sockets, only one of which will do for our project. We don't want the wire-wrap type. We want the type that has its pins running parallel to the sides of the socket. In other words, exactly like the pins on the EPROM.

Once you have obtained these items, you need to get your tools together and set up the operating room.

Pre-Op

Prepare the 28-pin socket for transplanting into the controller by doing the following steps, preferably in order:

1) Prepare a six-inch piece of wire-wrap wire by stripping off approximately 1½ inches of insulation from one end.

2) Look at the computer-mating end of the disk controller to determine if land 37 is missing (type 3 controller board). If it is missing, then the procedure is a little different and is so noted.

3) Carefully solder the bare part of the wire to near the tops of pins 27, 28 and 1 (and 26 if type 3 board). Start at 27 (26 on type 3 board) with the wire and end at pin 1, so that the remaining 4½ inches of insulated wire run off pin 1. It helps to wrap the wire around the pins before soldering. CAUTION: Do not apply too much heat for too long as the socket will melt and be unusable. (See Figure 1.)

4) If you have a controller board with a land 37, solder another piece of six-inch wire to near the top of pin 26.

5) Solder one last piece of six-inch wire near the top of pin 2.

6) Finally, if you have the type 3 board, clip off the excess wire coming from pin 1 and clip off pins 27, 28, 1 and 2 just below the soldered connections. Do *not* clip off pin 26.

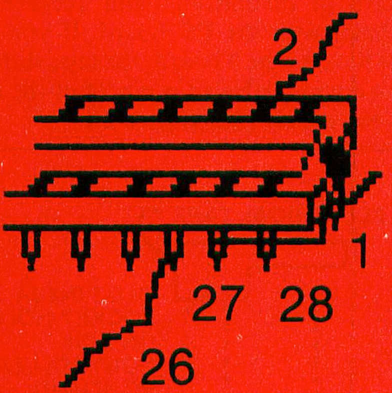


Figure 1

6a) If you have one of the other two boards, do *not* clip off the wire coming from pin 1, but clip pins 26, 27, 28, 1 and 2 just below the soldered connections.

The Operation

The 28-pin socket prepared for transplanting, it is time to bring our patient, the disk controller, into the operating room. Prep the patient by carefully peeling back the outer skin label, locate the joining screw and remove it. Then, with consummate surgical skill, spring the plastic locking tabs at one end of the controller, thus exposing the internal organs of your patient. Next, carefully pry out the 24-pin DOS-ROM chip and set it aside on a piece of conductive foam (RS# 276-2400) for safekeeping. (After all, that chip is worth at least $30.)

The next step is the most difficult, and the biggest test of surgical skills. You must desolder and remove the 24-pin chip socket. Take a deep breath and with soldering iron in one hand and solder sucker in the other, begin. Once you have done this, the operation is halfway over.

Once the removal process is completed, only a few additional preparatory steps remain before the actual transplant phase of the surgery begins. You should next execute the following surgical procedures. Next, on the controller board, locate and cut the trace that went to pin 18 of the 24-pin socket. Make sure you completely cut the trace so that there is no remaining contact. Locate and cut the trace that went to pin 21 of the 24-pin socket. Place a small piece of electrical tape on the controller board across the end of where the old socket sat, to provide an extra safeguard of insulation from accidental contact with the PC board. If you do not have a type 3 board, the tape should also cover the hole for pin 24 of the old 24-pin socket (See Figure 2.)

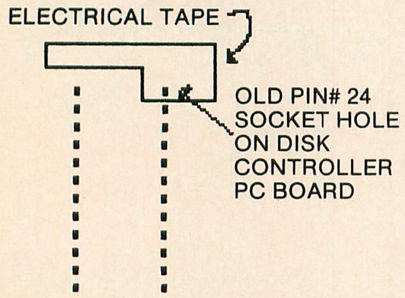


Figure 2

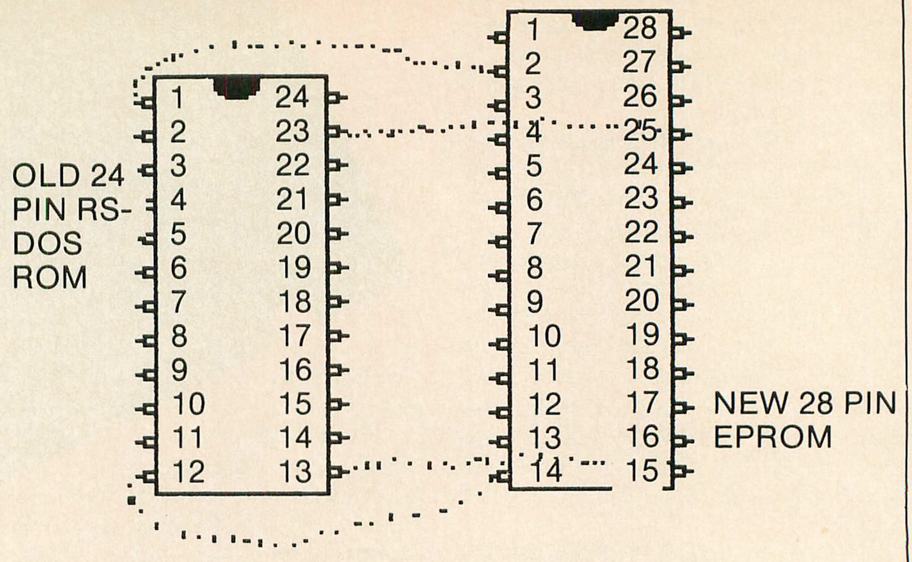


Figure 3

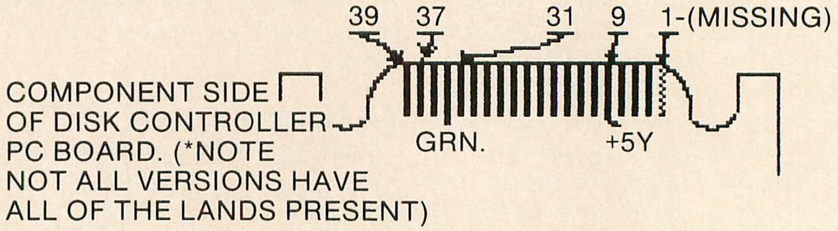

39
37
31
9
1-(MISSING)
COMPONENT SIDE OF DISK CONTROLLER PC BOARD. (*NOTE NOT ALL VERSIONS HAVE ALL OF THE LANDS PRESENT)
GRN.
+5Y

Figure 4

The Transplant

We now turn to the actual transplant of the 28-pin chip socket into the disk controller. It is here you demonstrate your surgical skills by re-connecting the arteries of the PC board that carry the date lines to the brains of the disk operating system. Perform the following steps.

1) Insert the 28-pin socket into the holes left by the 24-pin socket with the rear of the new socket in the same position as the old was (pin 14 to 12, 15 to 13, etc.). (See Figure 3.)

2) Solder the socket in place being careful not to create any solder bridges between the pins.

3) If you have the type 3 board, go to step five, otherwise cut the wire coming off socket pin 1 to the necessary length and solder it near the end of land 9, (a +5v source). (See Figure 4).

4) Likewise solder the wire from pin 26 to land 37.

5) Solder the wire from pin 2 to land 31.

6) On the PC board, solder a jumper wire from the solder pad for the trace that went to former pin 18 and connect it to pin 23 of the 28-pin socket.

7) Solder a jumper from pin 14 of the 28-pin socket to pin 20 of the 28-pin socket.

At this point, it would be very helpful to have a nurse around to wipe your brow. However, as this is a cheap operation, you'll have to do that yourself.

Post-Op

As with every good surgical procedure, it is necessary to inspect your work before closing up. Check your patient's internals for lost tools, bandages, swabs, etc. Be particularly careful to inspect all solder connections and make sure you have no bare wires touching where they shouldn't.

Finally, insert your programmed 28-pin EPROM, making sure the notches are all orientated the same way, and close up the case, installing the screw.

Physical Therapy

Now to see if it works. Hook up all the cables, plugs, drives, computer, etc. Place your finger on the computer's on/off button. Take a deep breath and push. If all went well, your DOS sign-on message should be displayed. If not, shut it down, check the patient for insurance and go back to square one.

(Questions may be directed to Mr. Armstrong at 4612 Harwen Terrace, Fort Worth, TX 76133. Please enclose an SASE when writing.) ☐

Build a lap keyboard and you'll have a . . .

Remote Control CoCo

By Marty Goodman

One of the single most crippling aspects of the present day Color Computer is the fact that its keyboard is physically fixed in the main "mother unit" box. I prefer to sit back in a reclining desk chair while typing. I cannot stand being hunched over a desk.

Over the last few years my partner and I have designed and built nearly a dozen remote Color Computer keyboard units and cables. We considered marketing such an item, but after perfecting a design for one we realized the necessary retail cost of such an item would be too high for it to succeed in the market. Only Tandy, with its in-house injection molding capabilities and mighty marketing muscle, is able to bring such an add-on item to the market. But, it has shown no signs of interest.

Making a lap keyboard for your CoCo is not hard for a hacker of even modest experience and ability. Nor is it terribly expensive. Here are some tips for those who would embark on such a project. Note that these are just tips. This is not intended as a "how to" article, but as a collection of helpful hints for someone who already has a good idea how to do the job.

You will need to run at least 15 lines between the CoCo and the keyboard. I also suggest running the Reset and Ground lines so you can put a remote Reset button on the lap keyboard. I also send the +5 volt line to the keyboard to support a power-on pilot light, and I send the "unused" extra keyboard PIA

Martin H. Goodman, M.D., a physician trained in anesthesiology, is a longtime electronics tinkerer and outspoken commentator — sort of the Howard Cosell of the CoCo world. Marty is the database manager of RAINBOW'S *CoCo Sig on Delphi. His non-computer passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.*

line as well. This comes to a total of 19 wires for my protocol.

Now comes the tough choice of a cable. The simplest way to go is to use ordinary rainbow ribbon cable, 20 conductor. This has the enormous advantage of being widely available and easy to work with. It does tend to tear, though it should work well if treated with care. I have used 20 conductor shielded ribbon cable for some of my remote keyboards. Such shielding does not really limit RFI, but will make your cable much more sturdy. Shielded ribbon cable is, however, much harder to work with, and if you are not familiar with how to use it I'd suggest you stay away from it.

The PIA chips that talk to the keyboard were not designed to send signals over long wires. But experience has shown that there is no problem when the keyboard is separated by less than eight feet of cable. I suggest you keep the keyboard cable under six feet, since there is a foot or two of wire inside the keyboard case and the CoCo.

I arranged for my keyboards to plug into my CoCo. The connectors I used were DB25 style. These are widely available and come in versions that can crimp on (IDC type) to ribbon cable.

The next problem is the choice of keyboard to use. One of the best choices is the CoCo II keyboard itself. Or an HJL or Mark Data keyboard. If you can find one, a discarded Model III keyboard is also an excellent choice. The Model III keyboard is wired very like the CoCo keyboard. Obtain schematics to see how few changes are needed to make it work properly. I also very much like the feel of the Model III keyboard.

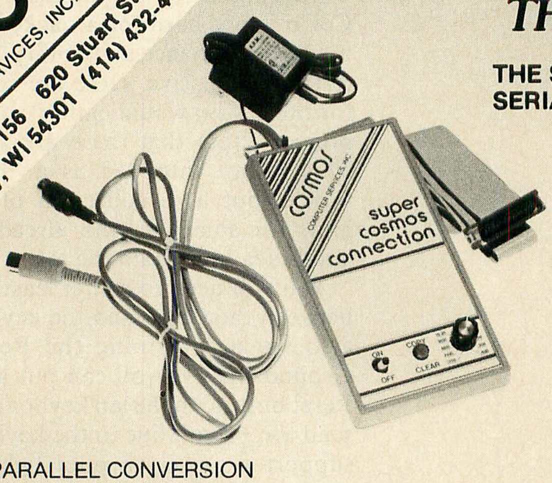
Do not try to rewire other types of keyboards. Some keyboards available on the surplus market use Hall effect or capacitive switches. Neither will work on a CoCo. Even keyboards that do use ordinary spst NO type switches are not good choices.

If you are using an existing CoCo 2 type keyboard, you need a way to connect to the plastic ribbon connector. This is easy. Just order one or two of part number AJ 7504 from Radio Shack National Parts in Fort Worth, Texas. When they ask you what product it is for, say it's for the CoCo 2 Cat. No. 26-3134. This item is an inexpensive AMP connector that fits the plastic ribbon cable. Solder that connector to a bit of printed circuit board and solder one end of the 20 conductor cable to it.

Making contact with the PIA lines in the CoCo where the keyboard normally plugs in is a little more tricky. You may wish to desolder the existing connector from the CoCo board and replace it with a piece of ribbon cable directly soldered in. Then just crimp a DB 25 connector on the other end of the ribbon cable and mount it on a face plate put where the old keboard used to go. If you are using an older CoCo, you will find the connector on the CoCo mother board is a little easier to use.

Finally, you must make a cabinet for your lap keyboard. I've used a lot of different approaches. In one case I used an LMB brand keyboarder chassis box. In another I used a Model I shell as the keyboard case. By far the nicest looking case was one that my partner Leonard Haines made from plywood. Another alternative is to literally saw off the front part of your CoCo (talk about hacking) and use that. I have seen this done successfully. I suggest putting the remote Reset button in the rear of the keyboard case, and a little recessed. It's easy to reach when you want it, and hard to hit accidentally.

If you have questions, I can be reached via Delphi, under username MARTYGOODMAN.



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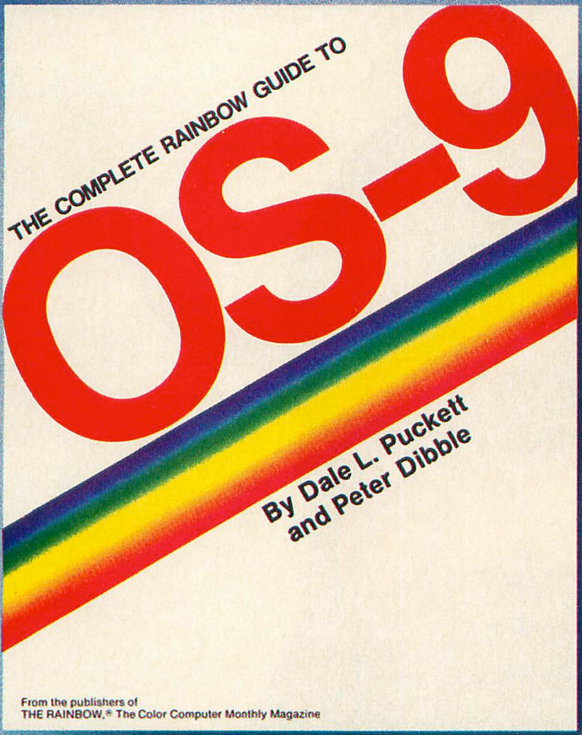
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A challenge for strategists

Vigilance is Vital for Victory Over Vicious Vic

By Jay R. Hoggins

Vicious Vic is a game of chance and strategy. It is not a shoot-em-up arcade-type game.

Your player is placed on a grid. Also randomly placed on the grid are electric fences, acid pots and, of course, the Vic fellows. Accumulate points in this game by destroying the *Vicious Vic* characters.

The first screen has eight Vics on it. If you are successful in clearing that screen, a new screen is generated with two more Vics than the previous screen had. Your turn is over when one of the Vics gets you or you bump into a pot or a fence.

Each time you move your player one step in any of the eight possible directions, each Vic moves one step towards you. You may take as much time as needed between each move. The Vics will not move until you do and no penalties to your score are assessed.

If you place your right hand on the keyboard in the normal touch typing position, your middle finger is on the 'K' key. This game allows you to move the player as if it is always at the 'K' key position. In order to move the player one step to the left, press the key directly to the left of the 'K' (the 'J' key). In order to move the player diagonally up to the right, press the key which is diagonally up to the right of the 'K' (the 'O' key), and so forth. To remind you which keys to use, the lower right corner of the game screen shows the player surrounded by the keys that may be pressed for the corresponding directions of movement.

Since the Vics are not terribly intelligent, they can be brought to an untimely end by moving your player so as to cause one or more Vics to collide with a pot or a fence. Do this to clear the screen of Vics while being careful not to step into a pot or a fence yourself.

Each time a Vic is electrocuted by a fence, you receive 11 points multiplied by the number of the screen you are on. Each time a Vic meets his end by stepping into an acid pot, you get 12 points multiplied by the screen number. If you are very clever, you can cause a Vic to bump into another Vic. This will net you 13 points times the screen number.

To maximize scoring, take the time to carefully plan your moves. This is

---

Jay Hoggins is a field engineer for Eastman Kodak where he services computer output microfilm and computer assisted retrieval equipment. Jay uses his CoCo for everything from word processing to programming in BASIC and machine language.

particularly true on the higher numbered screens since the number of points you receive is multiplied by the screen number.

If a Vic is electrocuted, both the Vic and the fence disappear. But if a Vic steps into an acid pot, only the Vic is destroyed and the acid pot survives to claim another victim. Take advantage of this by aligning your player behind an acid pot. Then you can move back and forth, causing the Vics to step into the pot one at a time. Be careful, though. One may sneak up behind you! ☐

40	189	400	0	1680	57
154	85	610	215	1930	58
158	172	672	191	2200	165
161	98	730	242	2360	64
165	188	840	8	2520	229
169	128	1070	37	2670	11
243	244	1190	170	2769	107
250	238	1350	10	END	244
		1510	154		

The listing: VIC

```
1 '****************************
2 '                 VICIOUS VIC
3 '  (C) 1985 BY JAY R. HOGGINS
5 '            1747 PATRICIA WAY
6 '          SALT LAKE CITY, UTAH
7 '                         84116
8 '****************************
9 '
10 'INITIALIZATION
11 CLEAR500,&H7DFF:CLEAR1000
12 DATA 158,186,48,137,17,235,95
,79,111,128,139,1,129,4,38,248,4
8,136,28,203,1,193,40,38,238,57,
158,186,79,95,111,128,195,0,1,16
,131,17,160,38,245,57
13 FOR AD=&H7E00 TO &H7E19:READQ
:POKE AD,Q:NEXTAD
14 FOR AD=&H7F00 TO &H7F0F:READ
Q:POKE AD,Q:NEXTAD
15 DEF USR0=&H7F00:DEF USR2=&H7E
00:DIM NA(20),P(64),F(12),FA(20)
,HA(20),MA(20),VA(20),C$(37),EX(
20),VS(20),HH(20),HI(20)
30 GOTO153
38 '
39 'PRINT CHARACTERS TO HIRES SC
REEN
40 X$=STR$(XB):Y$=STR$(YA):W$="B
M"+X$+","+Y$:DRAW W$:FOR LP=1 TO
 LEN(N$):L$=MID$(N$,LP,1):L=ASC(
L$)
50 IF L>=65 THEN L=L-54:GOTO90
60 IF L=32 THEN L=10:GOTO90
70 IF L=8 THEN L=37:GOTO90
80 IF L<=57 THEN L=L-48
90 DRAW C$(L):NEXTLP:RETURN
99 '
100 'PUTS FENCE AROUND GRID
110 Y=2:FOR X=3 TO 243 STEP 10:P
UT(X,Y)-(X+7,Y+4),FA,PSET:NEXTX
120 X=243:FORY=8 TO 134STEP6:PUT
(X,Y)-(X+7,Y+4),FA,PSET:NEXTY
130 Y=134:FORX=243 TO 3 STEP-10:
PUT(X,Y)-(X+7,Y+4),FA,PSET:NEXTX
140 X=3:FOR Y=134 TO 2STEP-6:PUT
(X,Y)-(X+7,Y+4),FA,PSET:NEXTY
150 RETURN
151 '
152 'TITLE SCREEN
153 DATA 3,0,1,5,1,0,1,1,1,41,1,
55,1,50,1,15,1,50,1,5,1,55,1,40,
1,55,1,40,1,50,1,14,1,5,1,54,1,0
,1,14,1,0,2,5,1,55,1,40,1,55,1,4
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50,1,14,1,15,1,55,1,0,1,14,1,0,2
,5,1,55
154 DATA 1,41,1,55,1,50,38,0,1,1
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,2,50,2,14,2,0,1,5,1,0,1,14,1,0
155 DATA 1,54,1,1,1,40,1,14,39,0
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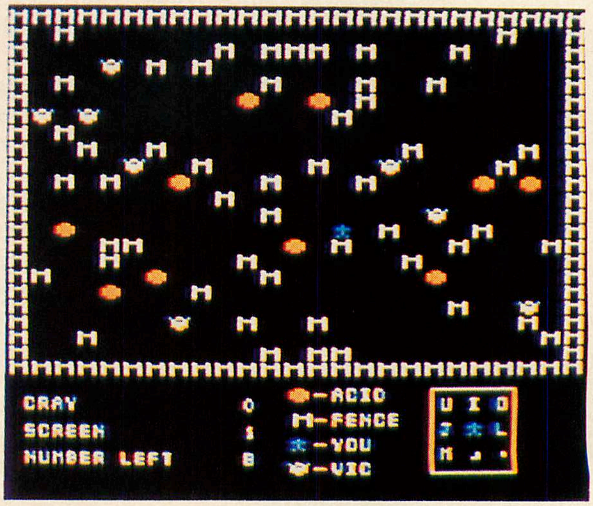

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1,1,1,40,2,50,1,14,1,0,1,5,2,0,1
,51,1,40,1,0,1,54,1,1,1,40,1,14,
7,0,1,14,1,50,1,0,1,15,1,0,1,50,
1,5,1,0,1,54,1,1,1,40,2,50,2,14,
1,5,2,0,1,51,1,40,1,0,1,54,1,1,1
,40
157 DATA 1,14,39,0,1,5,1,40,1,1,
1,55,1,50,1,55,1,54,1,5,1,55,1,4
1,1,55,1,50,1,55,1,54,1,15,1,55,
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1,50,7,0,1,5,1,40,1,1,1,55,1,50,
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0,1,5,1,55
158 DATA 1,40,1,55,1,40,294,0,1,
4,23,0,1,4,7,0,1,5,1,40,22,0,1,5
4,7,0,1,1,1,50,21,0,1,1,1,50,8,0
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0,1,5,9,0,1,5,1,40,20,0,1,15,9,0
,1,1,1,40,20,0,1,14,9,0,1,1,1,50
,20,0,1,54,9,0,1,1,1,50,20,0,1,5
4,10,0
159 DATA 1,54,20,0,1,50,10,0,1,5
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B,1,FF,1,FE,1,80,7,0,1,1,1,50,10
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,0,1,15
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F,1,FD,1,DF,2,FF,1,F8,5,0,1,15,1
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162 DATA 4,0,1,1,3,FF,1,FD,1,DF,
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,4,0,1,7,3,FF,1,FD,1,DF,2,FF,1,F
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4,0,1,3F
163 DATA 3,FF,1,FD,4,FF,1,E0,4,0
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,5,1,50,4,0,1,7F,3,FF,1,DD,4,FF,
1,F0,4,0,1,55,11,0,1,1,1,54,4,0,
4,FF,1,DD,4,FF,1,F8,3,0,1,1,1,54
,11,0,1,1,1,54,3,0,1,1,4,FF,1,DD
,4,FF,1,FC
164 DATA 3,0,1,1,1,54,11,0,1,1,1
,55,3,0,1,1,4,FF,1,DD,4,FF,1,FC,
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1,55,1,54,11,0,1,1,3,55,1,5A,1,A
B,4,FF,1,FD,4,FF,1,FE,1,AA,1,D5,
2,55,1,54,11,0,1,1,3,55,1,5A,1,2
7,4,FF,1,FD
165 DATA 5,FF,1,22,1,D5,2,55,1,5
4,11,0,1,1,3,55,1,58,1,8F,4,FF,1
,FD,1,DF,4,FF,1,88,1,D5,2,55,1,5
4,12,0,3,55,1,5A,1,3F,4,FF,1,FD,
1,DF,4,FF,1,E2,1,D5,2,55,1,50,12
,0,3,55,1,58,1,9F,4,FF,1,FD,1,DF
,4,FF,1,C8,1,D5,2,55,1,50,12,0,3
,55,1,5A,1,3F,4,FF,1,FD
166 DATA 1,DF,4,FF,1,E2,1,D5,2,5
5,1,50,12,0,3,55,1,58,1,BF,4,FF,
1,FD,1,DF,4,FF,1,E8,1,D5,2,55,1,
50,12,0,1,15,2,55,1,5A,1,7F,4,FF
,1,FD,5,FF,1,F2,1,D5,2,55,1,40,1
2,0,1,15,2,55,1,58,5,FF,1,FD,5,F
F,1,F8,1,D5,2,55,1,40,12,0,1,15,
2,55,1,5A,5,FF,1,FD,5,FF
167 DATA 1,FA,1,D5,2,55,1,40,12,
0,1,5,2,55,1,58,5,FF,1,DD,5,FF,1
,F8,1,D5,2,55,13,0,1,1,2,55,1,5A
,5,FF,1,DD,5,FF,1,FA,1,D5,1,55,1
,54,13,0,1,1,2,55,1,58,5,FF,1,DD
,5,FF,1,F8,1,D5,1,55,1,50,14,0,2
,55,1,5B,5,FF,1,DD,5,FF,1,FE,1,D
5,1,55,1,40,14,0,1,15
168 DATA 1,55,1,5B,5,FF,1,DD,5,F
F,1,FE,1,D5,1,55,17,0,1,1,5,FF,1
,FD,5,FF,1,FC,19,0,1,1,5,FF,1,FD
,5,FF,1,FC,19,0,1,3,5,FF,1,FD,5,
FF,1,FE,19,0,1,3,5,FF,1,FD,1,DF,
4,FF,1,FE,19,0,1,3,5,FF,1,FD,1,D
F,4,FF,1,FE,19,0,1,7,5,FF,1,FD,1
,DF,5,FF,19,0,1,7
169 DATA 5,FF,1,FD,1,DF,5,FF,19,
0,1,7,5,FF,1,FD,1,DF,5,FF,19,0,1
,7,5,FF,1,FD,6,FF,19,0,1,7,5,FF,
1,FD,6,FF,19,0,1,7,5,FF,1,FD,6,F
F,51,0,1,7,12,FF,19,0,1,F,12,FF,
1,80,18,0,1,F,12,FF,1,80,18,0,1,
F,12,FF,1,80,180,0,1,55,1,3,1,55
,3,0,1,15,1,40,1,D5
170 DATA 1,40,22,0,1,55,1,41,1,5
5,3,0,1,15,1,50,1,55,1,40,22,0,3
,55,3,0,1,15,2,55,1,40,22,0,1,15
```

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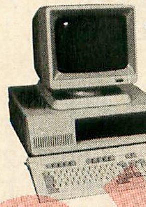

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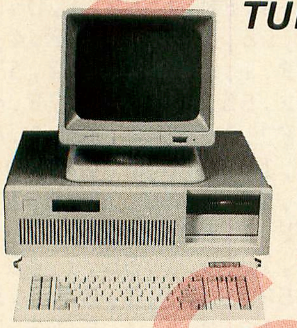

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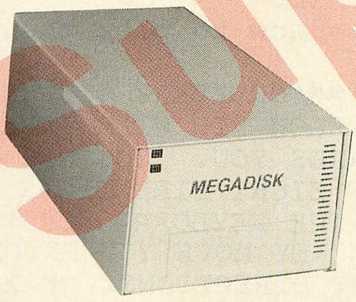

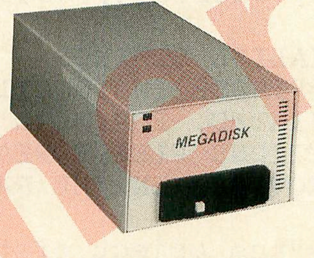

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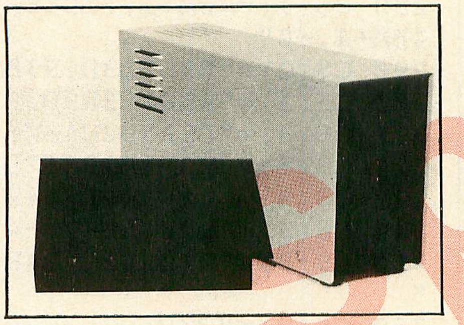

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```
,1,55,1,54,3,0,1,5,2,55,23,0,1,1
5,1,55,1,54,3,0,1,5,2,55,23,0,1,
5,1,55,1,50,3,0,1,1,1,55,1,54,24
,0,1,55,5,0,1,15,1,40,620,0,1600
,FF
200 PMODE4,1:SCREEN1,1:PCLS(0):A
D=PEEK(186)*256+PEEK(187)+&H02E0
201 FOR E=1 TO 861:READC,B$:FOR
AD=AD TO AD+C-1:POKE AD,VAL("&H"
+B$):NEXT AD,E
239 '
240 'INITIALIZE SCORES
241 N$(1)="JAY":N$(2)="BRADLEY":
N$(3)="BARBRA":N$(4)="BARBRA":N$
(5)="ANY NAME":N$(6)="WHAT NAME"
:N$(7)="THAT NAME":S(1)=2847:S(2
)=1698:S(3)=3145:S(4)=4542
242 '
243 'INITIALIZE STRINGS
244 A$(1)="THESE INSTRUCTIONS AR
E ABBRE- VIATED, FOR MORE COMPLE
TE INSTRUCTIONS PLEASE READ THE
ARTICLE PROVIDED IN THE RAINBOW.
"
245 A$(2)="the object of the gam
e-"
246 A$(3)="YOU ARE TRAPPED IN A
FIELD, SURROUNDED BY ELECTRIC FE
NCES.  A NUMBER OF CRAZY CHARACT
ERS (NICKNAMED VIC) ARE OUT TO G
ET YOU.  YOU MUST TRY TO DESTROY
 THEM BEFORE THEY DESTROY YOU.
WITHIN THE GRID ARE RANDOMLY PLA
CED ELECTRIC FENCES AND"
247 A$(4)="ACID POTS.  BOTH OF T
HESE ARE FATAL TO VIC.  HOWEVER
THEY ARE FATAL TO YOU TOO!  YOU
MUST MOVE WITHIN THE GRID"
248 A$(5)="AVOIDING THE POTS AND
 FENCES WHILE LURING VIC INTO TH
EM.  one note- IF VIC TOUCHES A
FENCE, BOTH THE FENCE AND VIC WI
LL BE DESTROYED.  BUT IF VIC TOU
CHES AN ACID POT, ONLY VIC WILL
BE DESTROYED."
249 A$(6)="how to play the game-
"
250 A$(7)="FOR EVERY STEP THAT Y
OU TAKE, EACH VIC WILL TAKE ONE
STEP TOWARDS YOU.  YOU MAY MOVE
IN ONE OF EIGHT DIRECTIONS.  THE
 KEYS ON THE KEYBOARD SURROUND-
ING THE K KEY MOVE YOU IN ONE OF
 THE EIGHT DIRECTIONS.  FOR"
260 A$(8)="INSTANCE, THE I KEY I
S DIRECT- LY ABOVE THE K KEY AND
 WILL MOVE YOU ONE STEP STRAIGHT
 UP THE SCREEN.  THE M KEY IS DO
WN AND TO THE LEFT DIAGONALLY FR
OM THE K KEY.  IT WILL CAUSE YOU
 TO MOVE DIAGONALLY DOWN TO THE
LEFT."
270 C$(0)="BM+0,+1D2BM+1,+1R1BM+
1,-1U2BM-1,-1L1BM+5,+0"
280 C$(1)="BM+1,+1D0BM+0,+3R2L1U
4BM+4,+0"
290 C$(2)="R3D2L3D2R3BM+3,-4"
300 C$(3)="R3D2L3R3D2L3BM+6,-4"
310 C$(4)="D2R3D2U4BM+3,+0"
320 C$(5)="R3L3D2R3D2L3BM+6,-4"
330 C$(6)="D2R3D2L3U4R3BM+3,+0"
340 C$(7)="R3D4BM+3,-4"
350 C$(8)="R3D2L3U2D4R3U4BM+3,+0
"
360 C$(9)="R3D4U2L3U2BM+6,+0"
370 C$(10)="BM+6,+0"
380 C$(11)="BM+0,+1D3U2R3D2U3BM-
1,-1L1BM+5,+0"
390 C$(12)="D4R2BM+1,-1U2D1L2R2U
1BM-1,-1L2BM+6,+0"
400 C$(13)="D4R3U1BM+0,-2U1L3BM+
6,+0"
410 C$(14)="R2BM+1,+1D2BM-1,+1L2
U4BM+6,+0"
420 C$(15)="D4R3L3U2R3L3U2R3BM+3
,+0"
430 C$(16)="D4U2R3L3U2R3BM+3,+0"
```

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```
440 C$(17)="D4R3U2L1BM-2,-2R3BM+
3,+0"
450 C$(18)="D4U2R3D2U4BM+3,+0"
460 C$(19)="R3L1D4R1L3R1U4BM+5,+
0"
470 C$(20)="R3L1D4L2U1BM+6,-3"
480 C$(21)="D4U2R1BM+1,+1R0BM+0,
-2R0BM+1,-1R0BM+0,+4R0BM+3,-4"
490 C$(22)="D4R3BM+3,-4"
500 C$(23)="D4U3R3D3U4BM+3,+0"
510 C$(24)="D4U3R1BM+1,+1R1D2U4B
M+3,+0"
520 C$(25)="D4R3U4L3BM+6,+0"
530 C$(26)="D4U2R3U2L3BM+6,+0"
540 C$(27)="BM+0,+1D2BM+1,+1R1U1
R1D1U3BM-1,-1L2BM+6,+0"
550 C$(28)="D4U2R3BM+0,+2L0BM-1,
-1L0BM+1,-1U2L3BM+6,+0"
560 C$(29)="R3L3D2R3D2L3BM+6,-4"
570 C$(30)="R3L1D4L1U4BM+5,+0"
580 C$(31)="D4R3U4BM+3,+0"
590 C$(32)="D3BM+1,+0D1R1U1BM+1,
+0U3BM+3,+0"
600 C$(33)="D4U1R3D1U4BM+3,+0"
610 C$(34)="R0BM+1,+1D2R1U2BM-2,
+3R0BM+3,+0R0BM+0,-4R0BM+3,+0"
620 C$(35)="D1BM+1,+1D2R1U2BM+1,
-1U1BM+3,+0"
630 C$(36)="R3BM-1,+1L0BM-1,+1L0
BM-1,+1D1R3BM+3,-4"
640 C$(37)="C0D4R1U4R1D4R1U4BM+2
,0C1"
648 '
649 'PLAY THEME SONG
650 PLAY"T2O2L4GP200GP200GP200L8
.E-P200O3L16B-P200":PLAY"O2L4GP2
00L8.E-P200O3L16B-P200O2L2GP200"
:PLAY"O3L4DP200DP200DP200L8.E-P2
00L16B-P200":PLAY"O2L4G-P200L8.E
-P200O3L16B-P200O2L2GP200"
658 '
659 'PRINT COPYRIGHT & WARNING
670 DRAW"C0":YA=144:XB=20:N$="CO
PYRIGHT 1985 BY JAY R HOGGINS":G
OSUB40:YA=152:XB=20:N$="WARNING"
:GOSUB40:YA=160:XB=20:N$="THE PR
OGRAMMER GENERAL HAS":GOSUB40:YA
=168:XB=20:N$="DETERMINED THAT T
HIS PROGRAM MAY":GOSUB40:YA=176:
XB=20:N$="BE ADDICTIVE"
671 GOSUB40:YA=184:XB=20:N$="USE
 AT YOUR OWN RISK":GOSUB40:DRAW"
C1"
672 FOR D=1 TO 2000:NEXTD
679 'CLEAR SCREEN
680 CLS(RND(8)):PRINT@192,""
688 '
689 'SET UP GRAPHICS
690 PMODE4,1:PCLS:PSET(97,56,1):
PSET(103,56,1):PSET(99,57,1):PSE
T(101,57,1):PSET(99,59,1):PSET(1
01,59,1):PSET(97,60,1):PSET(103,
60,1):GET(97,56)-(104,60),EX,G
700 FOR X=100 TO 102 STEP2:FORY=
40 TO 44 STEP4:PSET(X,Y,1):NEXTY
,X:FORX=98 TO 104 STEP6:FORY=41
TO 43:PSET(X,Y,1):NEXTY,X:GET(98
,40)-(104,44),HH,G:FOR X=98 TO 1
04 STEP2:FOR Y=41 TO 43 STEP2:PS
ET(X,Y,1):NEXTY,X:GET(98,40)-(10
4,44),HI,G
710 FOR X=98 TO 104:FOR Y=88 TO
90:PSET(X,Y,1):NEXTY,X:FOR X=100
 TO 102:FOR Y=87 TO 91 STEP 4:PS
ET(X,Y,1):NEXTY,X:PSET(97,87,1):
PSET(105,87,1):FOR X=100 TO 102:
FORY=88 TO 90 STEP2:PSET(X,Y,0):
NEXTY,X:GET(97,87)-(105,91),VS,G
720 PCLS:FOR X=100 TO 102 STEP 2
:FOR Y=40 TO 44 STEP 4:PSET(X,Y,
1):NEXTY,X:FOR X=98 TO 104 STEP
2:FOR Y=41 TO43:PSET(X,Y,1):NEXT
Y,X
730 XP=97:FOR X=XP TO XP+6 STEP6
:FORY=56TO60:PSET(X,Y,1):PSET(X+
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```
1,Y,1):NEXTY,X:Y=56:PSET(XP+2,Y+
1,1):PSET(XP+3,Y+1,1):PSET(XP+4,
Y+1,1):PSET(XP+5,Y+1,1)
740 PSET(101,72,1):PSET(99,73,1)
:PSET(101,73,1):PSET(103,73,1):P
SET(101,74,1):PSET(101,75,1):PSE
T(99,76,1):PSET(103,76,1)
750 FOR X=98 TO 104:FOR Y=88 TO
90:PSET(X,Y,1):NEXTY,X:FOR X=100
 TO 102:FOR Y=87 TO 91 STEP 4:PS
ET(X,Y,1):NEXT Y,X:PSET(97,87,1)
:PSET(105,87,1):FOR X=100 TO 102
:PSET(X,88,0):NEXTX
760 GET(97,56)-(104,60),FA,G
770 GET(98,40)-(104,44),HA,G
780 GET(99,72)-(103,76),MA,G
790 GET(97,87)-(105,91),VA,G
800 GET(97,97)-(105,102),NA,G
808 '
809 'ASK IF PLAYER WANTS INSTRUC
TIONS
810 PRINT@192,"    DO YOU WANT I
NSTRUCTIONS?              PRESS Y
OR N"
820 Z$=INKEY$:A=RND(10):IFZ$=""T
HEN820ELSEIFZ$<>"Y"THEN1120
828 '
829 'PRINT INSTRUCTIONS ROUTINE
830 W$=A$(1):GOSUB850
840 FOR R=2 TO 8:W$=A$(R):GOSUB8
60:NEXTR:GOSUB1040:GOTO1120
850 CLS(RND(8)):X=2:PRINT@3," VI
CIOUS VIC INSTRUCTIONS ";
860 IF X>15THEN1020
870 IF LEFT$(W$,1)=" "THENW$=RIG
HT$(W$,LEN(W$)-1):GOTO870
880 IF LEN(W$)<=30 THEN A$=W$:GO
TO930
890 FOR Q=31 TO 1 STEP-1
900 A$=MID$(W$,Q,1)
910 IF A$=" "THEN920 ELSENEXTQ
920 Q=Q-1:A$=LEFT$(W$,Q)
930 B$=A$
940 IF LEN(A$)>29 THEN 970 ELSE
FOR P=LEN(A$) TO 29
950 B$=B$+" "
960 NEXTP
970 PRINT@X*32-31,B$;
980 X=X+1
990 IF LEN(W$)<=30 THEN RETURN
1000 W$=RIGHT$(W$,LEN(W$)-Q)
1010 GOTO860
1020 GOSUB1040
1030 GOTO850
1040 PRINT@482," PRESS ANY KEY T
O CONTINUE ";
1050 FOR D=1 TO 50
1060 IF INKEY$=""THEN NEXTD ELSE
 1110
1070 PRINT@482,"
          ";
1080 FOR D=1 TO 50
1090 IF INKEY$=""THEN NEXTD ELSE
 1110
1100 GOTO1040
1110 RETURN
1118 '
1119 'SET UP SCREEN FOR SHOWING
HIGH SCORES
1120 NL=8:MN=8:PCLS:SCREEN1,1
1128 '
1129 'SCORE SORTING ROUTINE
1130 Q=1:FOR T=1TO5:FOR C=T TO 6
:IF S(7)<=S(C) THEN S(7)=S(C):N$
(7)=N$(C):Q=C
1140 NEXTC:FORRB=Q TO T STEP -1:
S(RB)=S(RB-1):N$(RB)=N$(RB-1):NE
XTRB:S(T)=S(7):N$(T)=N$(7):S(7)=
0:NEXTT:GOSUB100
1148 '
1149 'PRINT HIGH SCORES
1150 N$="HIGH SCORES":YA=40:XB=8
2:GOSUB40
1160 N$=N$(1):YA=50:XB=70:GOSUB4
0
1170 N$=STR$(S(1)):XB=124+6*(6-L
EN(STR$(S(1)))):YA=50:GOSUB40
1180 N$=N$(2):YA=60:XB=70:GOSUB4
0
1190 N$=STR$(S(2)):XB=124+6*(6-L
EN(STR$(S(2)))):YA=60:GOSUB40
1200 N$=N$(3):YA=70:XB=70:GOSUB4
0
1210 N$=STR$(S(3)):XB=124+6*(6-L
EN(STR$(S(3)))):YA=70:GOSUB40
1220 N$=N$(4):YA=80:XB=70:GOSUB4
0
1230 N$=STR$(S(4)):XB=124+6*(6-L
EN(STR$(S(4)))):YA=80:GOSUB40
1240 N$=N$(5):YA=90:XB=70:GOSUB4
0
1250 N$=STR$(S(5)):XB=124+6*(6-L
EN(STR$(S(5)))):YA=90:GOSUB40
1260 S(6)=0
1268 '
1269 'ASKS FOR PLAYERS NAME
1270 N$="PLEASE TYPE IN YOUR NAM
E":YA=110:XB=28:GOSUB40:SOUND100
,1
1280 LA=0:N$="":NA$="":XB=185
1290 Z$=INKEY$:IF Z$=""THEN1290
1300 PLAY"O4T50BO3":IF Z$=CHR$(8
) THEN 1370
1310 IF Z$=CHR$(13) THEN 1390
1320 IF ASC(Z$)<65 OR ASC(Z$)>90
 THEN 1290
1330 N$=Z$:YA=110:GOSUB40:XB=XB+
6
```

```
1340 NA$=NA$+Z$:LA=LA+1
1350 IF LA=8 THEN 1390
1360 GOTO1290
1370 LA=LA-1:IF LA<0 THEN LA=0
1375 IF LEN(NA$)<=0 THEN 1440
1380 NA$=LEFT$(NA$,LEN(NA$)-1):X
B=XB-6:N$=Z$:GOSUB40:GOTO1290
1388 '
1389 'SET UP GAME PLAYING SCREEN
1390 PCLS
1400 IF NA$="" THEN NA$=" "
1410 N$(6)=NA$:N$=NA$:YA=148:XB=
10:GOSUB40
1420 N$=STR$(S(6)):XB=76+6*(6-LE
N(STR$(S(6)))):YA=148:GOSUB40
1430 N$="SCREEN":XB=10:YA=159:GO
SUB40
1440 N$=STR$((MN/2)-3):YA=159:XB
=100:GOSUB40
1450 N$="NUMBER LEFT":YA=170:XB=
10:GOSUB40
1460 N$=STR$(NL):YA=170:XB=76+6*
(6-LEN(N$)):GOSUB40
1470 PUT(126,144)-(132,148),HA,P
SET
1480 PUT(127,154)-(134,158),FA,P
SET
1490 PUT(127,164)-(131,168),MA,P
SET
1500 PUT(125,174)-(133,178),VA,P
SET
1510 N$="ACID":YA=144:XB=144:GOS
UB40
1520 N$="FENCE":YA=154:XB=144:GO
SUB40
1530 N$="YOU":YA=164:XB=144:GOSU
B40
1540 N$="VIC":YA=174:XB=144:GOSU
B40
1550 PUT(203,158)-(207,162),MA,P
SET
1560 DRAW"BM136,146R4BM136,156R4
BM136,166R4BM136,176R4"
1570 N$="U I O":YA=148:XB=191:GO
SUB40
1580 N$="J":YA=158:XB=191:GOSUB4
0
1590 N$="L":YA=158:XB=215:GOSUB4
0
1600 N$="M":YA=168:XB=191:GOSUB4
0
1610 DRAW"BM206,170D2L2R3U2"
1620 DRAW"BM218,170D1L1U1"
1630 DRAW"BM186,144R36D34L36U34"
1632 G=USR0(NL)
1638 GOSUB100
1639 '
1640 'PUT RANDOM FENCES ON GRID
```

```
1650 FOR F=1 TO 52
1660 X=RND(23)
1670 Y=RND(21)
1680 X=(X*10)+3
1690 Y=(Y*6)+2
1700 IF PPOINT(X,Y)<>0 THEN 1660
1710 PUT(X,Y)-(X+7,Y+4),FA,PSET
1720 NEXTF
1729 '
1730 'PUT RANDOM HOLES ON GRID
1740 FOR H=1 TO 10
1750 X=RND(23):Y=RND(21)
1760 X=(X*10)+4:Y=(Y*6)+2
1770 IF PPOINT(X-1,Y)<>0 THEN 17
50
1780 IF PPOINT(X+2,Y+2)<>0 THEN
1750
1790 PUT(X,Y)-(X+6,Y+4),HA,PSET
1800 NEXTH
1809 '
1810 'PUT RANDOM VIC'S ON GRID
1820 FORD=1 TO 32:P(D)=0:NEXTD
1830 FOR M=1 TO MN
1840 X=RND(23):Y=RND(21)
1850 X=(X*10)+3:Y=(Y*6)+2
1860 IF PPOINT(X,Y)<>0 THEN 1840
1870 IF PPOINT(X+1,Y+1)<>0 THEN
1840
1880 PUT(X,Y)-(X+8,Y+5),VA,PSET
1890 P((M*2)-1)=X:P(M*2)=Y
1900 NEXTM
1909 '
1910 'PLACE AND FLASH THE PLAYER
1920 X=RND(23):Y=RND(21)
1930 X=(X*10)+5:Y=(Y*6)+2
1940 IF PPOINT(X-2,Y)<>0 THEN 19
20:'CATCHES MAX'S AND FENCES
1950 IF PPOINT(X-1,Y+2)<>0 THEN
1920:'CATCHES HOLES
1960 PUT(X,Y)-(X+4,Y+4),MA,PSET
1970 FOR D=1 TO 20
1980 Z$=INKEY$:IF Z$<>""THEN2050
1990 NEXTD
2000 PUT(X,Y)-(X+4,Y+4),NA,PSET
2010 FOR D=1 TO 20
2020 Z$=INKEY$:IF Z$<>""THEN2050
2030 NEXTD
2040 GOTO1960
2050 PUT(X,Y)-(X+4,Y+4),MA,PSET
2060 IF Z$="U"THEN2150
2070 IF Z$="I"THEN2160
2080 IF Z$="O"THEN2170
2090 IF Z$="J"THEN2180
2100 IF Z$="L"THEN2190
2110 IF Z$="M"THEN2200
2120 IF Z$=","THEN2210
2130 IF Z$="."THEN2220
2140 GOTO1960
```

```
2150 XN=X-10:YN=Y-6:GOTO2230
2160 XN=X:YN=Y-6:GOTO2230
2170 XN=X+10:YN=Y-6:GOTO2230
2180 XN=X-10:YN=Y:GOTO2230
2190 XN=X+10:YN=Y:GOTO2230
2200 XN=X-10:YN=Y+6:GOTO2230
2210 XN=X:YN=Y+6:GOTO2230
2220 XN=X+10:YN=Y+6:GOTO2230
2230 IF PPOINT(XN-2,YN)=5 AND PP
OINT(XN-1,YN)=0 THEN 2280:'CHECK
 FOR VIC
2240 IF PPOINT(XN-2,YN)=5 AND PP
OINT(XN-1,YN)=5 THEN 2380:'CHECK
 FOR FENCE
2250 IF PPOINT(XN-1,YN+2)=5 THEN
 2430:'CHECK FOR HOLE
2260 PUT(X,Y)-(X+4,Y+4),NA,PSET
2270 X=XN:Y=YN:PUT(X,Y)-(X+4,Y+4
),MA,PSET:GOTO2470
2279 '
2280 'YOU HIT A VIC
2290 PUT(X,Y)-(X+8,Y+5),NA,PSET:
XN=XN-2
2300 PUT(XN,YN)-(XN+8,YN+5),VS,P
SET
2310 PLAY"T4O2L4GP200GP200GP200L
8.E-P200O3L16B-P200O2L4GP200L8.E
-P200O3L16B-P200O2L2G"
2320 PUT(XN,YN)-(XN+8,YN+5),VA,P
SET:FORD=1 TO 100:NEXTD
2330 PUT(XN,YN)-(XN+8,YN+5),VS,P
SET:FOR D=1 TO 100:NEXTD
2340 PUT(XN,YN)-(XN+8,YN+5),VA,P
SET:FOR D=1 TO 100:NEXTD
2350 PUT(XN,YN)-(XN+8,YN+5),VS,P
SET:FOR D=1 TO 100:NEXTD
2360 PUT(XN,YN)-(XN+8,YN+5),VA,P
SET:FOR D=1 TO 200:NEXTD
2370 GOTO1120
2379 '
2380 ' YOU HIT A FENCE
2390 PUT(X,Y)-(X+4,Y+4),NA,PSET
2400 PUT(XN-2,YN)-(XN+5,YN+4),EX
,PSET
2410 PLAY"T255AGAGAGAG":PUT(XN-2
,YN)-(XN+5,YN+4),FA,PSET:PLAY"AG
AGAGA":PUT(XN-2,YN)-(XN+5,YN+4),
EX,PSET:PLAY"GAGAGAGAGAGAG":PUT(
XN-2,YN)-(XN+5,YN+4),FA,PSET
2420 GOTO1120
2429 '
2430 ' YOU HIT A HOLE
2440 PUT(X,Y)-(X+4,Y+4),NA,PSET
2450 PLAY"T255ABCDEFG":PUT(XN-1,
YN)-(XN+5,YN+4),HH,PSET:PLAY"ABC
DEFG":PUT(XN-1,YN)-(XN+5,YN+4),H
I,PSET:PLAY"ABCDEFG":PUT(XN-1,YN
)-(XN+5,YN+4),HA,PSET
2460 GOTO1120
2470 'VIC MOVE ROUTINE (MN=NUMBE
R OF ROBOTS)
2480 FOR DQ=1 TO MN*2 STEP 2
2490 IF P(DQ)=0 THEN 2780
2500 IF NL=0 THEN GOTO2830
2510 XR=P(DQ):YR=P(DQ+1)
2520 QX=X-XR-2
2528 '
2529 'SET UP MOVE DIRECTIONS
2530 IF QX<0 THEN H=-10
2540 IF QX=0 THEN H=0
2550 IF QX>0 THEN H=10
2560 QY=Y-YR
2570 IF QY<0 THEN V=-6
2580 IF QY=0 THEN V=0
2590 IF QY>0 THEN V=6
2600 QX=XR+H:QY=YR+V
2608 '
2609 'CHECK TO SEE IF A VIC GOT
YOU!
2610 IF QX=X-2 AND QY=Y THEN PUT
(QX,QY)-(QX+8,QY+5),VA,PSET:X=XR
:Y=YR:XN=QX+2:YN=QY:GOTO2290
2618 '
2619 'SEE IF VIC HIT A VIC
2620 IF PPOINT(QX,QY)=5 AND PPOI
```

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Computerware®'s Products of the Month

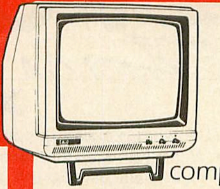
Color Connection III

by BJ Chambless

This is the most comprehensive modem package for the Color Computer! All standard protocols are supported including CompuServe's **Protocol B, XMODEM protocol**, and **XON/XOFF**. Full support of the auto answer/auto dial feature for both Hayes compatible and Radio Shack modems is provided. You can use **all baud rates** when using the Radio Shack Deluxe RS232 program pack! A **big buffer** of up to 42K is offered (64K is required for maximum buffer size.) You can print directly from the buffer, and files bigger than the buffer can be uploaded. The automatic XON/X-OFF protocol downloads direct to disk as well! Printer baud rates are selectable from the software.

The hi-res 51 x 24 screen has optional inverted colors and anti-truncation. All printable characters are available at the keyboard and all control characters are supported including ESCape, RUB, DEL, etc. Single key **macros** allow easy entry of often used passwords and ID's with a single key touch. Our introduction to Data Communications tutorial and glossary of terms are included. You won't find a better telecommunication package anywhere! Requires 32K, modem, and disk drive.

32K RSDOS Disk $49.95



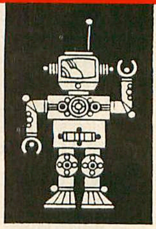
Universal Video Plus

composite video interface for all Color Computers!

We would like you to look at our **Universal Video Plus** and would dare you to compare it with any other video interface. We feel confident that you will see that it is the **best product** and the **best buy** in CoCo monitor drivers ever!

- The Universal Video Plus works with **every CoCo**. Easy-to-follow, **clear instructions** are included.
- **All cables** (audio & video) are included. No need to buy extenders or extra cables as required by other drivers.
- **Heavy duty construction**, evidenced by sturdy leads and connectors.
- **Shielded audio & video cables** insure that no extra RF interference is introduced from the Universal Video Plus, unlike other interfaces.
- The **adjustment** pot on the Universal Video Plus makes it **easy to optimize** the video signal for each computer. You don't have to modify your computer to get good display!
- Our advanced design gives the **highest quality display.**
- **Installation is easy**. There is no soldering and no dismantling of the RF shield.

Universal Video Plus **$34.95**



Robot Odyssey

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Robotropolis is an underground city inhabited by friendly and foe robots. Built in five levels, your escape is achieved in five increasingly difficult stages from the sewer where friendly robots aid you to the skyways. Each robot has one eye, a grabber, an antenna, four thrusters, four bumpers, and a battery. You must learn to operate, modify, and design their circuitry to escape from Robotropolis!

While having fun you will learn about the inside of robots, integrated circuitry, and logic.

Requires 64K, Disk $34.95

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SPECIAL OFFER

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CoCo cable $25.00

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Green 12" Amber 12" **$105.00**

plus $5 shipping

SAKATA Color Monitor

Beautiful 13" color display with 280 x 300 line resolution. Includes composite video color and audio.

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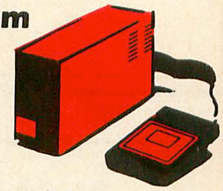

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OS-9 Communications program.

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- Definable macro keys
- Works with standard serial port, RS232 PAK, or PBJ 2SP Pack. Includes all drivers.
- Works with standard screen. XSCREEN, or WORDPAK 80 column board

$49.95 with source **$89.95**

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- Works with standard screen, XSCREEN, WORDPAK, O-PAK

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- Easy menu operation

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- Complete pattern matching

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- +, —, *, /, AND, OR, XOR, NOT

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- Works with standard text screen, XSCREEN, WORDPAK, or O-PAK
- True character oriented full screen editing
- Full block commands
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- Proportional spacing supported
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These programs are user friendly and menu driven. Sample transactions are included. Each package features a hi-res screen. Each requires a printer, a minimum of 32k and at least 1 disk drive.

PAYROLL Designed for maintaining personnel and payroll data for up to 200 hourly and salaried employees with 8 deductions each. Calculates payroll and tax amounts, prints checks and maintains year-to-date totals which can be automatically transferred to the SBA package. Computes each pay period's totals for straight time, overtime and bonus pay and determines taxes to be withheld. Additional outputs include mailing list, listing of employees, year-to-date federal and/or state tax listing, and a listing of current misc. deductions. Suited for use in all states except Oklahoma and Delaware. **$59.95**

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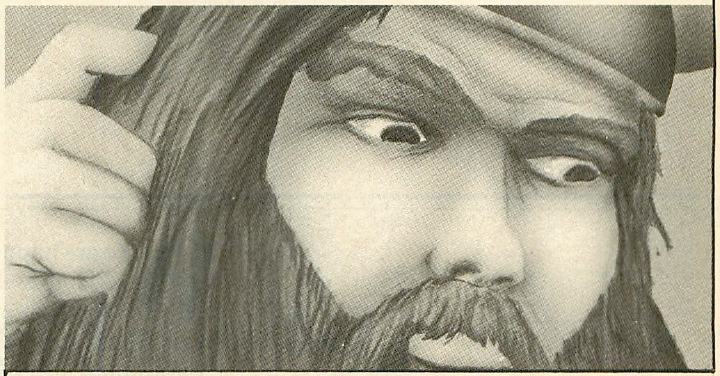
```
NT(QX,QY+1)=0 THEN 2630 ELSE 267
0
2630 PLAY"T30O1CGCGCGCT2O3"
2640 PUT(XR,YR)-(XR+8,YR+5),NA,P
SET:NL=NL-1:S(6)=S(6)+10*(1.3)*(
(MN/2)-3):P(DQ)=0:P(DQ+1)=0
2650 IF NL=0 THEN GOTO2830
2660 GOTO2780
2668 '
2669 'VIC HITS A FENCE?
2670 IF PPOINT(QX,QY)=5 AND PPOI
NT(QX,QY+1)=5 THEN 2680 ELSE 272
0
2680 PUT(XR,YR)-(XR+8,YR+5),NA,P
SET:NL=NL-1:S(6)=S(6)+10*(1.1)*(
(MN/2)-3):P(DQ)=0:P(DQ+1)=0
2690 PLAY"T255AGAGAGAG":PUT(QX,Q
Y)-(QX+7,QY+4),FA,PSET:PLAY"AGAG
AGA":PUT(QX,QY)-(QX+7,QY+4),EX,P
SET:PLAY"GAGAGAGAGAGAG":PUT(QX,Q
Y)-(QX+7,QY+4),FA,PSET:PUT(QX,QY
)-(QX+8,QY+5),NA,PSET
2700 IF NL=0 THEN GOTO2830
2710 GOTO2780
2718 '
2719 'VIC HITS A HOLE?
2720 IF PPOINT(QX+3,QY)=5 AND PP
OINT(QX+3,QY+1)=5 THEN 2730 ELSE
 2770
2730 PUT(XR,YR)-(XR+8,YR+5),NA,P
SET:S(6)=S(6)+10*(1.2)*((MN/2)-3
):NL=NL-1:P(DQ)=0:P(DQ+1)=0
2740 PLAY"T255ABCDEFG":PUT(QX+1,
QY)-(QX+7,QY+4),HH,PSET:PLAY"ABC
DEFG":PUT(QX+1,QY)-(QX+7,QY+4),H
I,PSET:PLAY"ABCDEFGT2":PUT(QX+1,
QY)-(QX+7,QY+4),HA,PSET
2750 IF NL=0 THEN GOTO2830
2760 GOTO2780
2768 '
2769 'MOVE VIC WITHOUT HITTING A
NYTHING
2770 PUT(XR,YR)-(XR+8,YR+5),NA,P
SET:PUT(QX,QY)-(QX+8,QY+5),VA,PS
ET:P(DQ)=QX:P(DQ+1)=QY
2780 NEXT DQ
2788 '
2789 'UPDATE SCORE
2790 AC=USR2(NL):N$=STR$(S(6)):X
B=76+6*(6-LEN(STR$(S(6)))):YA=14
8:GOSUB40
2792 '
2793 'UPDATE SCREEN NO.
2794 N$=STR$((MN/2)-3):YA=159:XB
=100:GOSUB40
2798 '
2799 'UPDATE NUMBER OF VICS LEFT
2800 N$=STR$(NL):YA=170:XB=76+6*
(6-LEN(STR$(NL))):GOSUB40
2810 GOTO1960
2819 '
2820 'YOU CLEARED THE SCREEN
2830 AC=USR2(NL):N$=STR$(S(6)):Y
A=148:XB=76+6*(6-LEN(STR$(S(6)))
):GOSUB40:MN=MN+2:NL=MN
2835 N$=STR$((MN/2)-3):YA=159:XB
=100:GOSUB40
2837 N$=STR$(NL):YA=170:XB=76+6*
(6-LEN(STR$(NL))):GOSUB40
2840 FOR D=220 TO 230:PMODE3,1:S
CREEN1,1:SOUNDD,2:PMODE4,1:SCREE
N1,1:FORDA=1TO10:NEXTDA:NEXTD:FO
R D=1 TO 100:NEXTD
2850 GOTO1632
```



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Building an OS-9 Support Network

By Cray Augsburg
Rainbow's CoCo SIGop

We are happy to welcome an old friend as a new staff member on the RAINBOW Color SIG. **Steve Bjork** (6809ER), a professional programmer, joined the staff in May. Steve is now handling the OS-9 topic in our database.

Steve holds a degree in computer science and began working with computers in 1972.

In the late 1970s Steve started a small computer company, Computer Light and Sound, selling software for the TRS-80 Models I and III. Most of these programs were games, light pen drivers and software-controlled voice and music synthesizers.

About 1980, Steve started work for Datasoft Inc. It was here that Steve was introduced to the Color Computer and he began writing software for it. Some of Steve's programs Tandy has marketed are *Zaxxon*, *Sands of Egypt*, *Micro-Painter*, *Clowns & Balloons*, *Mega-Bug*, *Audio Spectrum Analyzer* and *Popcorn*. Steve was soon in charge of all software that Datasoft wrote for Tandy.

In 1983 Steve left Datasoft to start his own company, SRB Software. At SRB, Steve oversees all program development. In the past three years they have produced such programs for the Color Computer as *Stellar Life Line*, *Ghana Bwana*, *One on One*, *Pitfall II* and *The Motion Picture*.

Public domain software like *Coterm* and the *Mouse* interface are also being developed at SRB. Steve says he feels "software houses should pay back the user who purchases their products by developing such free software."

Steve has also developed many hardware devices over the years. He has developed a home control system based on the CoCo 2 that includes an alarm system. One of this system's novel options is turning on a lawn watering system when an intruder is detected by the computer's infra-red sensors, thus making it easier to identify the culprit.

Steve's hobbies include remote-control cars and planes, video games and going to Disneyland.

We are sure you will find his knowledge of the 6809 microprocessor and his dedication to similar systems will make OS-9 a viable force on the Delphi network. After all, he is the 6809ER!

Surcharges

A surcharged file is simply a program or group of programs for which you must pay an extra fee in addition to connect time charges for the right to

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Cray Augsburg is RAINBOW's technical assistant and has an associate's degree in electrical engineering. He and his wife, Ruth Ann, have two children and live in Louisville, Kentucky. His username on Delphi is RAINBOWMAG.

download. They are denoted by a dollar sign ($) at the end of the group name. In the CoCo SIG, all surcharged files carry a charge of $3.50.

All files in the RAINBOW ON TAPE database area, for instance, are surcharged. Some of the files appearing in the OS-9 database are surcharged: those from the "KISSable OS-9" column in RAINBOW.

There are some questions as to just how the system charges you for downloading these "extra-cost" files. Try to visualize a group of files (there may only be one file in some groups) as a room. When you open the door to that room and enter, the door automatically closes behind you. While you are in the room, you may download as many of the files as you want, as many times as you want. When you are satisfied with what you have, you may leave the room (CONTROL-Z) and the door again closes behind you.

> **"Try to visualize a group of files . . . as a room. When you open the door and enter, the door automatically closes behind you."**

It is at this point that you are charged for your downloads. You are only charged $3.50 regardless of what you have done in that room. If none of your download attempts were successful or they were aborted, you are not charged at all. This should clear up any questions, but if you are still concerned, contact me through the Forum.

Shopping

While the Shopping area of our Color SIG is being used to market Falsoft products—magazines and books, for instance, may be ordered online — we are phasing in other advertisers as well. For more information on how to market your products in Shopping, contact **Jim Reed** (JIMREED) at RAINBOW.

Polls and Surveys

If you need other opinions on a burning question, you may create a poll online to survey our SIG members. Just type `POLL` at the main SIG menu prompt. Up to 20 polls can be posted at the same time.

At regular intervals of about two months, Jim Reed will archive the polls in the Topics section of the SIG, so even the older polls are available for review. You may review the results as well as the candid comments of other users in the Topics section. It is very easy to create your own survey, so you might give it a try.

Baud Comparison

Not long ago, **Marty Goodman** (MARTYGOODMAN) asked me to run a little test since I use a 2400 Baud modem. He wanted to find out what the download time differences would be between 300, 1200 and 2400 Baud. I took a little time one Saturday afternoon to do this.

With *Mikeyterm* in hand (or rather, computer), I went into the MS-DOS SIG database to find a good, large file. I stumbled across *Yahtzee*, which is 15,232 bytes, or 119 blocks long. Using Xmodem protocol, I downloaded the file three times to achieve the following results:

300 Baud — 10 min. 21 sec.
1200 Baud — 3 min. 52 sec.
2400 Baud — 2 min. 55 sec.

Marty downloaded the file at 1200 baud to get a check on my results and it took three minutes and 53 seconds (almost exactly the same).

The fact that 2400 Baud was nowhere near twice as fast as 1200 came as no suprise. As Marty explains it, the handshake time required for downloading takes up a good deal of the overall time. This fraction becomes larger at higher

Database Manager's Report

As **Cray Augsburg** (RAINBOWMAG) has already told you, the biggest news in our database is the arrival of Steve Bjork as our official OS-9 section leader. Steve is actively involved in developing OS-9-based software. Soon his name will be just as well-known as the author of definitive OS-9 programs as it is currently for Disk Extended BASIC games and graphics.

We look forward to the rapid growth of the OS-9 section and we already have plans to allocate more section topics to cover what we anticipate will be a growing number of OS-9 users. The Delphi CoCo SIG is committed to fully supporting OS-9. We want to see a section where both software developers and end-users can use the Delphi CoCo SIG as a meeting place to share ideas and develop more and better OS-9 software options, and where those with questions can go for prompt and authoritative answers.

Over the last three months I've developed and stocked the Graphics, General, Utilities, Product Reviews and Hardware Hacking topic areas. Cray has been stocking the Games topic area. **Don Hutchison** (DONHUTCHISON) and **Art Flexser** (ARTFLEXSER) have joined me in building the Source Code for 6809 Assemblers topic (formerly known as the Assembly Language topic) area.

We want to encourage those with their own or public domain Music files to contact either me or Cray on Delphi. We may be able to arrange *free connect time* for you to assist you with uploading such material, and in part repay you for your efforts.

New in the Database

General

I've posted instructions on how to use the DOT commands in the forum to make your messages appear neater to others who read them, and a report on the loss of the last spare GOES (*WEFAX*) satellite in the explosion of a Delta Rocket booster. **Erik Gavriluk** (ERIKGAV) has given us two computer essays on programming humor and Cray has added a classic prankster program, *Fool*.

Source Code for 6809 Assemblers

Don Hutchison has put several tutorials here, and Art Flexser is in the process of uploading some of his. These are combinations of essays and assembly language source code to aid the beginning and intermediate assembly language programmer. This series of tutorials was originally written by Don and Art for CompuServe's CoCo SIG, and appears here through their generosity and with the kind consent of Wayne Day, SysOp of the CompuServe CoCo SIG.

Don has also uploaded source code for *SuperDupe*, one of the best single-drive, disk duplication utilities written.

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Princeton, New Jersey
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Hotel: Hyatt Regency-Princeton
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Advance Ticket Deadline:
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Show Schedule:
Friday evening
— Exhibits open from 7 p.m. to 10 p.m.
Saturday
— CoCo Community Breakfast at 8 a.m.
— Exhibits open at 10 a.m. and close at 6 p.m.
Sunday
— Exhibits open from 11 a.m. to 4 p.m.

Oct. 17-19
Princeton

RAINBOWfest is the only computer show exclusively dedicated to your Tandy Color Computer. Nowhere else will you see as many products, have access to the top experts, or be able to attend free seminars. It's the next best thing to receiving the latest issue of THE RAINBOW in your mailbox!

Every RAINBOWfest features many delightful surprises. It's a great opportunity for commercial programmers to show off new and innovative products for the first time. You get the jump on new capabilities for your CoCo. In exhibit after exhibit, there are demonstrations, opportunities to experiment with software and hardware, and special RAINBOWfest prices.

You can set your own pace between visiting exhibits and attending the valuable, free seminars on all aspects of your CoCo — from improving BASIC skills to working with the sophisticated OS-9 operating system.

Many of the people who write for THE RAINBOW — as well as those who are written about — are there to meet you and answer your questions. You'll also meet lots of other people, just like you, who share your interest in the Color Computer. It's a person-to-person event, as well as a tremendous learning experience, in a fun and relaxed atmosphere.

To make it easier for you to participate, we schedule RAINBOWfests in different parts of the country. If you missed the fun in Chicago, Illinois, why don't you make plans now to join us in Princeton? For members of the family who don't share your affinity for CoCo, you'll be comfortable knowing that RAINBOWfest is located in an area with many other attractions.

The Hyatt Regency-Princeton offers special rates ($79, single or double room) for RAINBOWfest. The show opens Friday evening with a session from 7 p.m. to 10 p.m. It's a daytime-only show Saturday — the CoCo Community Breakfast (separate tickets required) is at 8 a.m., then the exhibit hall opens promptly at 10 a.m. and runs until 6 p.m. Sunday, the exhibit hall opens at 11 a.m. and closes at 4 p.m.

Tickets for RAINBOWfest may be obtained directly from THE RAINBOW. We'll also send you a special reservation form so you can get your special room rate.

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Advance ticket deadline: Oct. 10,1986. Orders received less than two weeks prior to show opening will be held for you at the door. Tickets will also be available at the door at a slightly higher price. Tickets will be mailed six weeks prior to show. Children 4 and under, free; over 4, full price.

Baud. The actual transmission time is relatively stable and small.

Marty mulled over this information for a few days and came up with an idea. What if someone were to write a "variable block length" protocol? The ideal would be one that started transmitting blocks of 128 bytes. As more and more blocks are transmitted error free, the software would start transmitting increasingly larger (256 bytes, 512 bytes) blocks. If an error were to occur, the next blocks would be small again and start the increase all over. With this type of protocol, much of the system overhead in file transfer could be eliminated. If anyone is interested in this idea, please contact us.

> **"The fact that 2400 Baud was nowhere near twice as fast as 1200 came as no surprise."**

As those who visit the Delphi CoCo SIG already know, Marty has agreed to produce a new technical question-and-answer column for RAINBOW, beginning with the August issue. Marty's column succeeds the popular "Earth to Ed" series.

Ed Ellers was recently promoted to managing editor of Soft Sector magazine here at Falsoft.

We welcome Marty's technical expertise on the pages of RAINBOW and remind you that the quickest way to get your technical questions answered is to post them in the CoCo Sig forum.

Next Month

In the past several issues we have discussed many of the ideas and concepts presented on our CoCo SIG. In the August issue we will backtrack and present a detailed description of how to upload and download programs from the databases.

I've uploaded a set of six assembly language subroutines for use in assembly language programming to handle screen I/O and create a point-and-pick menu selector.

Erik has uploaded specification information for his *McPaint* printer drivers to assist assembly language programmers who wish to write their own assembly language drivers for *McPaint*.

Don has also provided source code for some disk and tape scanning utiltities. These provide the start, end and execute addresses of ML programs. And he has provided source code for *Babybas*, a 64K RAM program allowing you to turn a Disk Extended BASIC computer into an Extended BASIC or Color BASIC computer without pulling out the disk drive controller.

Games

Michael Holman (MHOLMAN) has given us a "Mad Libs" type game, where you fill in adjectives and adverbs to complete a story in a humorous way. **Bill Lippert** (BEERBELLY) has given us a Yahtzee game. RAINBOW Magazine has added 20 former Chromasette arcade and Adventure games to this database.

Graphics

I've just added a gallery of 19 original works of art by Noel Fallon. Noel uses *Graphicom*, *CoCo Max* and *Graphicom II*. I've also put up a new version of the *Eclipse Editor* by Danny Brown. This is a dedicated "fat bits" type editor for touching up graphics images created with other graphic editors. Written in assembly language with a joystick and firebutton-driven interface, it represents months of work by Danny. An earlier version was sold by Moreton Bay Software, who kindly consented to allow us to post this version free of any surcharge.

I've also posted a group of converter programs that allow CoCo owners to download and view Commodore 64 *Doodle* art files, and a program called *Flags* that draws the flags of about 30 different nations.

Richard Trasborg (TRAS) has contributed a likeness of Zsa Zsa Gabor. Erik Gavriluk has given us an interesting rotation demo, and **Mark Kowit** (TOBOR8) has contributed some pop art-like digitized images of everyday things. **Keith Smith** (UGLY) has given us a wryly amusing sign called *Attaboy.* **James Barnes** (SEAJAY) has contributed a printer graphics pinup calendar. Erik has also given us a gallery of art by Erik White.

Utilities

Bill Haesslein (BILLH) has given us a driver for the Radio Shack version of the Wordpak 80-column card, designed to run with ADOS. **Robert Pierce** (RPIERCE) has provided *Trackdump*, a program that uses the track-read command to show all the details on your disk, including the sector header and gap bytes *not* seen by normal Zap utilities. Michael Holman has given us a mini-BBS program, and Bill Lippert has provided some PASCAL trigonometric utilites.

Don Hutchison has given us *Nutrax*, a utility that formats an additional five tracks on 35-track disks without hurting the old 35 tracks. This can aid those converting their systems to 40-track Disk Extended BASIC varients. Don has also uploaded a color testing utility called *ColorBar.*

One of most amazing new uploads is *KDSK* from **Kenneth Wuelzer** (WUELZERKEN), a complex disk zap utility for Disk Extended BASIC, FLEX, and MS-DOS disks. This one must be seen to be believed!

Art Flexser has uploaded a package for fast disk duplication. This program comes with source code and documentation, as well as a working binary object code version.

RAINBOW Magazine has uploaded eight new utitilies including a Hi-Res screen driver, business grahics package, CGP-115 screen dump program and a `LIST` command disabler. Those eight were originally released as Chromasette programs.

OS-9 Database

Just prior to Steve Bjork's coming aboard, Cray uploaded the June 1986 RAINBOW Magazine "Kissable OS-9" software to the OS-9 database.

SIG Etiquette

On occasion, folks PAGE us on the CoCo SIG. Whenever we can, we speak with members. But, at times, we may be busy and unable to rush to conference. We suggest you first use the SEN command (SEN USERNAME message you want to send) to *ask* us if we are free. Try "SEN USERNAME are you free for a chat?" That way, we have the option of responding "Sorry, am busy right now."

Conclusions

We are pleased with our growth in the database so far, but much needs to be done. We look forward to a dynamic and expanding OS-9 section under the leadership of Steve Bjork, and we will continue to work on expanding all other sections. Indeed, some big suprises are awaiting Delphi users over the next few months. Stay tuned!

— Marty
(MARTYGOODMAN)
Delphi CoCo SIG Database Manager

Translation Sensation

By Joseph Kolar
Rainbow Contributing Editor

Our objective today is to create an educational program that may be of value to you, your siblings, children or friends.

We are going to make a foreign language sentence translation program. The plan is to display a sentence in one language on the text screen and underneath it display a translation in a second language. It may be translated word by word, phrase by phrase or in toto.

The Creative Process

How do you transfer an idea into reality? First, conceptualize the idea in its most basic component. In this instance, the sentence and its translation in a second language must be placed on the screen. Color, available in Color BASIC, will be used to enhance the presentation.

Even though you may visualize an idea in great detail, it is not good practice to try to work up an intricate idea. As you add bits and pieces to the program, you will constantly modify and alter the creation. New insights will cause you to deviate further from the original concept. Assuredly, the end result will be something more sophisticated than that visualized at the beginning.

Further, when you use the supposedly "final" version of the program, you will get many ideas for change. It will metamorphose again and again through additional periods of development.

This is the greatest benefit to a programmer as opposed to a ready-made software user. The user of a store-bought program buys a program — nothing more. He is confined to the parameters of the software. He can do no more than what the author envisioned.

On the other hand, the budding programmer, having created his program from a modest beginning, can bend the program to his will by altering, expanding and enhancing it over a period of time — each version just a bit better than the previous one. There is a sense of accomplishment and fun for the creator.

The Translation Program

What language shall we use to demonstrate? Latin is fine because it has long vowel signs that can be dispensed with. German has umlauted vowels (indicated by two dots over the vowel) and a special double 'S' character. These can be overcome by adding an 'E' after the umlauted vowel and using "SS." French, Spanish and Italian all have special accent marks. But I hesitate using any of these languages without being able to indicate the accent marks for this demo program.

There is one language, Romanian, that has special characters and accents that can be used to illustrate how a little ingenuity can solve this problem. I also wanted to use an unfamiliar language to show more forcefully the value of this type of program.

There are five characters in Romanian that present problems. In my program, these non-English characters are represented by symbols. A 'T' with a commma underneath (pronounced "TS") became the up-arrow. An 'S' with a comma underneath, (pronounced "SH"), became the dollar sign. The gutteral 'I' and an old-fashioned 'A' became the apostrophe, and an accented 'A' became the '@' sign.

Now, to work! From Listing 1, key in lines 1, 2, 10, 20 and 21. In Line 1, the

---

Florida-based Joseph Kolar is a veteran writer and programmer and specializes in introducing beginners to the powers of CoCo.

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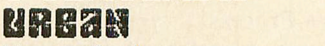
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beginning of the first language is located on the fourth row, one space in from the left margin (X=97). The translation begins four lines below, one space in (Y=225).

In order to have a colored screen background, I decided to use all the colors except green, Color 1. This was done by `Z=RND(7)+1`. Green never appears because if CoCo produces a random 1, it must add 1, giving Color 2. Color 6 (cyan) doesn't give much contrast, so as an afterthought, if `Z=6`, we told CoCo to reject it and try again, otherwise to the next program line called.

> *"We will take this equivalent pair of sentences and, section by section, create an ongoing translation."*

Lines 2 through 9 are reserved for `GOSUB`s. `GOSUB`s can be put at high line numbers after the main program. But, being lazy, I prefer to key in one digit `GOSUB`s rather than three or four digit ones. This stratagem saves typing time, memory space and wear and tear on my mind recalling `GOSUB` numbers. They are conveniently grouped at the beginning of the program for easy reference.

Look at Line 2. We want to print at 'X' (beginning at the left side) the sentence designated by string `X$`, 'P' number of characters/spaces. This is the first language sentence. The semicolon chops off the trailing blanks at the end of the sentence rather than allowing them to continue to the right margin. Then the program waits until any key is pressed. At location 'Y', we begin from the left (starting) side of the second language sentence to show 'Q' number of characters/spaces that translates the equivalent 'P' characters/spaces of the first language. It waits for a key press and returns.

Line 10 is a dual purpose line. It clears the screen to some color 'Z' and directs CoCo to `GOTO20`.

Each time you go to a new work area, you change the `GOTO` to bypass all the lines completed and go directly to the desired site.

Program segments, incremented by 10 are from Line 20 through 980. Each segment has three or four lines incremented by one.

In Line 20, string `X$` designates the first language. The sentence is enclosed within quotes. Two initial blank spaces precede the text of the sentence. After the punctuation mark, a single blank space follows.

Line 21 presents the `Y$` string, (the second language) in the same rigid format.

An important note: In this program, the invisible vertical line (refer to last month's tutorial) will always fall directly underneath the opening quote. For the purposes of locating any 'P' or 'Q' character or space, the first line of a sentence begins at the opening quote, numbered zero. Following the imaginary vertical line, the second line begins with character/space 32. The next row begins with number 64, then 96 and finally 128.

The length of the statements is confined to 159 letters/spaces, primarily because long lines are unwieldy to program or study.

Next, we'll tell CoCo how to display the two sentences. Look at lines 20 and 21. Count the number of characters/spaces in the string. Did you count 27? Key in `22 P=27`. Now count the number of characters/spaces in Line 21. Did you get 26? Add `Q=26:GOSUB2` and press ENTER to tell CoCo what we want it to do. Now run it. If you used `P=31:Q=P (Q=31)` instead, you would get the same result because CoCo stops at the actual end of a string. Change 'P' to 159 and try it.

If you count less than the total contents of a string, you will get a shortened sentence. Try using P=24. This is exactly what we want. Now we know that we can chop the sentence into segments at whatever point we select. Delete Line 22 and look at lines 20 and 21 again. We will take this equivalent pair of sentences and, section by section, create an ongoing translation.

Count the number of spaces up to and including the space after the first word in `X$`. Did you get six? Key in `22 P=6:`. Do the same for the first word in `Y$`. Did you get eight? Add `Q=8:GOSUB2`. `GOSUB2` only acts on `LEFT$(X$,6)` and `LEFT$(Y$,8)`. Run this and then press BREAK. List lines 20 and 21, edit Line 22 and let's do the next word.

Remember, we conveniently work from the screen. Count the number of characters/spaces and include the one after the second word in `X$`. Press 'X' to get to end of the line and add `:P=11`. Using the same system, find the value of 'Q' in `Y$` and add `:Q=12:GOSUB2`. Again, run and press BREAK then list lines 20 and 21, and edit Line 22. Count up to and include the space after the third word in both `X$` and `Y$` to determine 'P' and 'Q'. Press 'X' to end and add the appropriate information; now run. Did you remember to add `GOSUB2` at the end? Since P=19 and Q=19, you can use P=19 and Q=P. Press BREAK and finish the sentence. You should have added `:P=27:Q=26:GOSUB2` to Line 22. Again, run and press BREAK.

You could separate this sentence in two more ways. Edit Line 22, type `32` and `D`, press ENTER and run. In other words, you can break it up into phrases or groups of words or display the whole works. For practice, revise Line 22 to display two words at a time, working from the listing on the screen, then delete Line 22.

Remember, `GOSUB2` is used only to add sections to a program, not to display the entire sentence. We will create `GOSUB3` specifically to display the entire sentence as a unit.

Key in lines 3, 30, 31 and 990. Look at Line 3. The limit of characters to be displayed is 159. CoCo displays the entire string up to our predetermined limit, in turn. We will select a new screen, but we won't reject Color 6 this time. We'll call up a new screen and return. To bypass the segment at Line

20 to go to a new work area, edit Line 10, press 'X', the left arrow twice, type 30 and press ENTER.

List lines 30 and 31. Accomplish the mission with 32 GOSUB3. Run this and press BREAK. Change GOSUB3 to GOSUB2 and try it again.

Now delete Line 32 and list lines 30 and 31. "Pun" corresponds to "I put." The other words are equivalent. Count the first segment. It ends one space after "Pun" to get 'P' value. The first translated segment ends one space after "put" to find Q value. Key in 32 P=6:Q=8:gosub2. Run and press BREAK.

List lines 30 and 31. "O carte" is equivalent to "A book" so we can count up to and include the spaces after the 'E' and 'K' respectively to get 'P' and 'Q'. Edit Line 32, press 'X' and ENTER then type :P=14:Q=15:GOSUB2 and run it. Press BREAK and list lines 30 and 31. Edit Line 32, press ENTER and 'X'. Let's add "pe" and "on" respectively. Obviously, we must add three to each previous 'P' and 'Q' value. Type :P=17:Q=18:GOSUB2 and run.

To add the balance of each line you could do it the regular way: Press BREAK, edit Line 32, press 'X' and ENTER. Type P=26:Q=27:GOSUB2. Run this and press BREAK. Instead of P=26:Q=27:GOSUB2, why not use :GOSUB3? Try this: Edit Line 32, press 'X' and ENTER. Backspace to the colon after GOSUB2. Type GOSUB3 and run it.

That's better, isn't it? We saved the bother of counting and keying in the final segment and still displayed it.

Press BREAK and list Line 32. Study Line 32 and notice the sequence, GOSUB2:GOSUB3, at the end of the line. We know that when we break up a sentence into parts we use GOSUB2 at the end of each part. We know the final segment is added on without calculation by using GOSUB3. Therefore, in a sentence broken up into two or more parts, the usual ending is GOSUB2:GOSUB3. This suggests making a GOSUB4 to replace GOSUB2:GOSUB3.

Key in Line 4. To see if it works, edit Line 32, press 'X' and ENTER. Backspace to the '2' of GOSUB2. Type 4, press ENTER and run. We have completely eliminated figuring out the values for the last segment.

The rule is — when we get to the next to the last segment of a sentence, after calculating the values of 'P' and 'Q', we add GOSUB4. The GOSUB4 causes GOSUB2 to place the next to last segment on the screen. GOSUB3 then overprints what is on the screen and adds the balance of the sentence.

If you do not follow the system faithfully, you may get lines that slip to the left. This is due to not maintaining the compulsory space at the end of a segment. Recheck the P's and Q's.

Key in lines 5, 40 and 41; list lines 40 and 41. This is an exact word-for-word translation. Sometimes it is desirable to display the first language for preview before dissecting it to display the component parts. Line 5 accomplishes this mission.

On your own, working from the screen, determine the values of 'P' and 'Q' and display each pair of words in succession. If you are encountering gremlins, check Line 42 of the listing. When you get it right, you will want to put GOSUB5 into action.

Edit Line 40, press 'X' and ENTER. Type :GOSUB5, press ENTER and run. Substitute GOSUB3 for GOSUB5 and see the difference.

Thus far, we have kept our sentences short enough to fit on one screen line. Press BREAK and list Line 41. These are the most characters/spaces we can fit on a line. This is the only instance when we do not leave a trailing space. We are forced to put the closing quote directly underneath the opening quote. Press BREAK and run. The period is at the right edge. Press BREAK. Insert the usual ending blank space and see what happens, then RESTORE the line to its original state.

Key in 22 GOSUB3 and 32 GOSUB3 to make the two segments display something. Mask Line 990 with a REM.

Key in Line 999. This line clears the screen to a random color and puts the repeating legend on top of the panel, indicating that we have viewed the entire program. After a pause, the first part of Line 20 is automatically displayed. Note that Line 10 was bypassed and on repeat, CoCo goes to Line 20 and runs through the entire program. Of course, after finalizing the program, you would want to EDIT 10 to begin at Line 20 so it starts at the beginning.

Next month, we will continue and explore multiple-line sentences: where the word order is not compatible for a word-for-word translation, where one segment is separated by intervening words and other ways to present sentences for study. ☐

The listing: LANGTUTR

```
0 'LISTING1
1 X=97:Y=225:Z=RND(7)+1:IF Z=6 G
OTO1 ELSE GOTO10
2 PRINT@X,LEFT$(X$,P);:EXEC44539
:PRINT@Y,LEFT$(Y$,Q);:EXEC44539:
RETURN
3 P=159:Q=159:PRINT@X,LEFT$(X$,P
);:EXEC44539:PRINT@Y,LEFT$(Y$,Q)
;:Z=RND(7)+1:EXEC44539:CLSZ:RETU
RN
4 GOSUB2:GOSUB3:RETURN
5 P=159:PRINT@X,LEFT$(X$,P);:EXE
C44539:CLSZ:RETURN
10 CLSZ:GOTO20
20 X$="  CEI CARE ASCULT@ 'NVA^@
. "
21 Y$="  THOSE WHO LISTEN LEARN.
 "
22 GOSUB3
30 X$="  PUN O CARTE PE UN RAFT.
 "
31 Y$="  I PUT A BOOK ON A SHELF
. "
32 GOSUB3
40 X$="  NE VOM DUCE M'INE DIMIN
EA^@. "
41 Y$="  WE SHALL GO TOMORROW MO
RNING."
42 P=5:Q=P:GOSUB2:P=9:Q=11:GOSUB
2:P=14:Q=P:GOSUB2:P=20:Q=23:GOSU
B4
990 'GOTO990
999 CLSZ:PRINT@10," REPEATING..
";:FOR S=1 TO 1000:NEXT:GOTO20
```

16K
ECB

Achieving Arcade Game Speed in BASIC

By Fred B. Scerbo
Rainbow Contributing Editor

Editor's Note: If you have an idea for the "Wishing Well," submit it to Fred c/o THE RAINBOW. Remember, keep your ideas specific, and don't forget that this is BASIC. All programs resulting from your wishes are for your use but remain the property of the author.

How many years has it been now? THE RAINBOW is having another anniversary! It seems only yesterday that I had my first phone conversation with Lonnie back when the magazine was four pages long and done by photocopying. The first program I gave Lonnie was a simple BASIC arcade game called *Zelda's Bat Bottle.* That arcade game was the beginning of a long friendship which eventually resulted in the creation of "The Wishing Well," a forum to share your ideas and wishes.

While most of my offerings in those early issues of THE RAINBOW were games, there have been only a few times in the past few years that I have offered an arcade-style game. Therefore, to help celebrate the fifth anniversary, I am offering a revised listing of one of my favorite creations, *Advanced Star* Trench Warfare.*

Fred Scerbo is a special needs instructor for the North Adams Public Schools in North Adams, Massachusetts. He holds a master's in education and has published some of the first software available for the Color Computer through his software firm, Illustrated Memory Banks.

Humble Origins

The "advanced" part of the title does not have anything to do with the skill level required to play the game. Rather, I had created an earlier version of the game in the pages of THE RAINBOW back in November 1982. That game, *Star* Trench Warfare* was a very short program with none too elaborate graphics.

The purpose of that game was to try something totally new with the Color Computer. While fooling around with the concept of *Star*Trench,* I decided to view the screen with a set of red and blue 3-D glasses. At that time several TV stations were broadcasting the old 3-D classics *Creature From The Black Lagoon* and *Gorilla,* so local chain stores were handing out free 3-D glasses. I happened to glance at some CoCo graphics while preparing to view one of the movies when, low and behold, the glasses seemed to give the graphics a 3-D look.

Naturally, I completed the game and let Lonnie know that THE RAINBOW would have the honor of printing this first pseudo 3-D computer game. The response to the game was so good that Wayne Green even made reference to it and to THE RAINBOW in his rival publication, *80 MICRO.* Since the game seemed to work with machine language speed from BASIC, I decided to rewrite the program and publish an advanced version.

Thanks to Lonnie and the staff of THE RAINBOW, we have a forum for our software in these pages. Judging from my mail, many of you are just as grateful to him as I am. Otherwise, RAINBOW wouldn't be celebrating another anniversary.

Therefore, to help celebrate with my friends at THE RAINBOW I have chosen to offer *Advanced Star*Trench Warfare* in a slightly updated version, rather than let it collect dust on my disks.

The Program

*Star*Trench* is written entirely in BASIC and fits in a 16K Extended Color BASIC machine without any modifications. The code is extremely tight as compared to recent listings in the "Wishing Well." The first difference is that the lines of the program are numbered by ones rather than tens. This is

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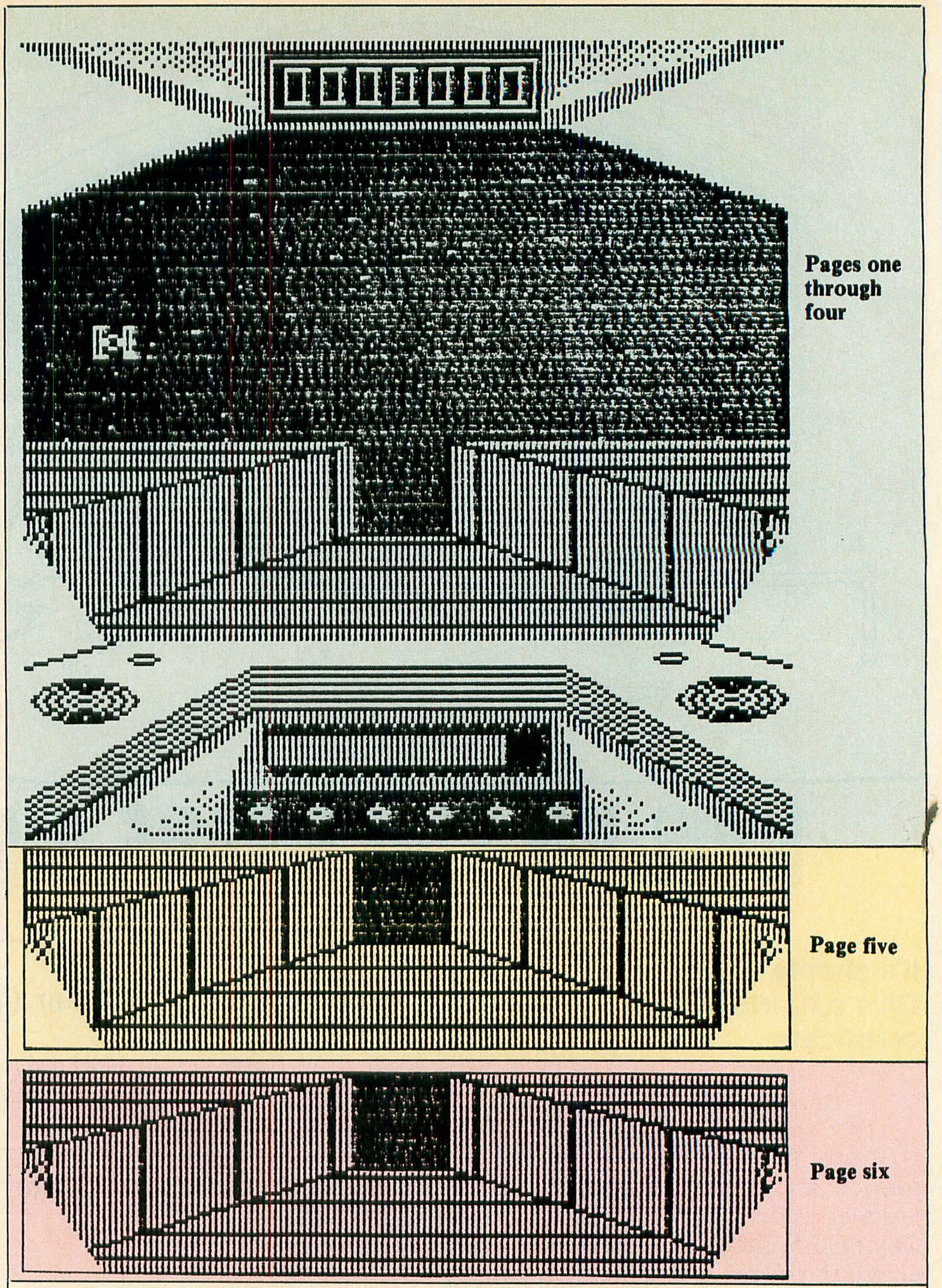
because the program uses nearly all available memory. I have even reduced to one line the `REM` statement title that usually fills the top of the listing.

The published version of this game had an IMB title card which I have since discarded for a newer look using the *Titlemaker* program from a few months ago. For those who want to speed up the already rapid action, I suggest you add this line: `0 POKE65495,0`, and save the program before running it. I have left this line out of the listing and the RAINBOW ON TAPE version so as to not mess up anyone's disk drive. Remember, use this poke with caution. Always `POKE65494,0` to return to normal speed.

The rapid motion of the moving trench is accomplished using the `PCOPY` command. At the start of the program, `PCLEAR6` to reserve two extra graphics pages (five and six). BASIC in `PMODE3` or `4` uses four graphics pages to fill the screen. Pages five and six are kept from view to store our two views of the moving trench.

At the beginning of the program, we draw the two views of the trench and `PCOPY` them to pages five and six. Later on, as these pages are `PCOPY`ed to our visible page three (which is the third quarter of the screen from the top), they will give the illusion of motion. Since the `PCOPY` command is actually a machine language routine called from the computer's ROM, it executes instantly, giving a rapid animation effect.

I have included an illustration to show the technique. The top four pages give the full screen. Directly below it in memory are the two trench graphics, which are copied up to page three. This technique was also used in *Snail's Revenge* from a few years ago. Naturally, I will use it again if it gives the effect I am looking for.



ABOVE: Pages one through four show the action screen while the animation frames are kept out of our vision in pages five and six.

Playing the Game

The theme of *Star*Trench* is a familiar one. You must defend the star trench from attack by alien spacecraft. The action is viewed from the cockpit window of a single pilot spacecraft. The moving trench is in front of you. Press the red firebutton on the right joystick to activate the forward lasers. The joystick aims the shots in nine possible positions (three up and down, three left and right). As you fire shots, the energy level decreases. If you run out of energy, you crash into the trench. (If you survive three minutes without being hit, you get a free recharge.) If you do not destroy the alien craft within its first ten movements, it begins shooting back. If you get hit, your shields crack and you dive into the trench. Whenever your craft is destroyed, your gauges recharge if you have any lives remaining. You only get six.

When you have run out of lives, the screen displays the score and the previous high score. Press ENTER to begin a new game.

Final Notes

For a real treat, try the game with a pair of 3-D glasses. I think you will like the effect.

I am glad to give this game a parting shot by presenting it in these pages. Not long after it was released, a psychological firm in California contacted me and asked permission to obtain a modified version of the game to test reflex responses. Naturally, I was thrilled to see the game put to some serious use. Jim Reed also told me it was one of his favorite games since it didn't take too much effort to play, but was still a lot of fun.

Therefore, you can imagine how glad I am to finally offer it to all of the faithful RAINBOW subscribers and "Wishing Well" fans.

See you next month! □

7	208
15	178
20	102
28	28
37	83
51	188
END	180

The listing: TRENCH

```
1 'ADVANCED STAR*TRENCH WARFARE
   BY FRED B.SCERBO (C)1982,1986
   60 HARDING AV.N.ADAMS,MA01247
2 GOTO61
3 CLEAR260:CLS0:PRINTSTRING$(32,
252);:PRINT@44,"advanced";:PRINT
@96,"";
4 FORI=1TO192:READA:PRINTCHR$(A+
128);:NEXT:DATA62,60,60,56,60,62
,56,62,61,53,60,58,68,77,76,69,7
6,74,69,76,76,72,79,66,,74,78,76
,72,69,64,69,60,60,60,58,,58,,62
,61,53,61,56,,69,,69,77,72,69,76
,76,72
5 DATA74,77,66,74,74,,,69,76,77,
60,60,60,56,48,56,,56,52,52,52,6
0,48,68,,68,68,76,68,76,76,72,72
,,76,72,76,76,72,68,64,68,42,37,
,42,46,44,44,42,46,44,44,42,,37,
44,44,44,44,40,46,44,44,44,42,46
,44,44,42,37,44,44,44
6 DATA42,37,,42,46,44,44,42,46,4
5,44,40,,37,44,44,44,44,40,46,44
,44,44,42,46,45,44,40,37,44,44,4
4,44,44,44,40,40,,,40,40,36,44,4
4,32,36,,,,,,40,,,,40,40,36,44,4
4,36,44,44,44
7 PRINT@320,STRING$(32,243);:PRI
NT@391," BY FRED B.SCERBO ";:PRI
NT@423," (C)  1982 & 1986 ";
8 DIMS$(3),G(3),H(3),G$(3),H$(3)
,Z$(9)
9 SCREEN0,1:PMODE3,1:PCLS2:PMODE
4,1:Q$="BRC0NU4RU4RD4RU4RD4RU4RN
L4D2NL4D2L6C1":FORI=0TO9:READZ$(
I):NEXT
10 DATABR2U4R3D4NL3,BR4NU4BR,BR2
U2R3U2NL3BD4NL3,BR2R3U2NL2U2NL3B
D4,BR2BU2NU2R3U2D4,BR2R3U2L3U2R3
BD4,BR2U4NR3D2R3D2NL3,BR2BU4R3D4
,BR2U4R3D2NL3D2NL3,BR2BU2NR3U2R3
D4
11 E$="NR2DNR2DR2BR":LINE(0,18)-
(112,0),PRESET:LINE-(144,22),PRE
SET,BF:LINE-(256,47),PRESET:LINE
(256,18)-(144,0),PRESET:LINE(0,4
7)-(112,22),PRESET:LINE(0,48)-(2
56,48),PRESET
12 PMODE3,1:PAINT(10,30),3,1:PAI
NT(246,30),3,1:PAINT(128,44),3,1
:PMODE4,1:PCOPY1TO4:RL=6:TS=0
13 A=2:B=104:C=24:GOSUB23:A=6:B=
72:C=30:GOSUB23:A=12:B=40:C=38:G
OSUB23:A=16:B=8:C=44:GOSUB23:GOS
UB15:PCOPY1TO5:PCOPY4TO1
14 A=4:B=88:C=28:GOSUB23:A=10:B=
56:C=34:GOSUB23:A=14:B=24:C=42:G
OSUB23:GOSUB15:PCOPY1TO6:GOTO16
15 PMODE3,1:R$="U24C2F2E4F2G4C4N
H3F20L24":DRAW"C4S4BM0,47"+R$:R$
="U24L4C2H2G2F4C4NE3G20R28":DRAW
"BM255,47"+R$:PAINT(3,41),4,4:PA
INT(253,41),4,4:PMODE4,1:RETURN
16 PMODE3,1:PCLS1:COLOR2,1:LINE(
0,40)-(76,20),PSET
17 LINE-(180,20),PSET:LINE-(256,
40),PSET:LINE(76,20)-(0,0),PSET:
LINE(180,20)-(256,0),PSET:PAINT(
10,2),2,2:PAINT(10,20),4,2:PAINT
(246,20),4,2:PMODE4,1:LINE(0,144
)-(256,192),PSET,BF:FORI=1TO65:P
SET(RND(256),RND(66)+30):NEXT
18 PMODE3,1:FORI=0TO10STEP2:LINE
```

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```
(0,192-I)-(76,160-I),PRESET:LINE
-(180,160-I),PRESET:LINE-(256,19
2-I),PRESET:NEXT:PAINT(128,190),
2,1:PMODE4,1
19 FORI=2TO18STEP4:FORY=20TO236S
TEP216:CIRCLE(Y,158),I,0,.5-(I/1
00):NEXTY,I:FORY=40TO216STEP176:
CIRCLE(Y,148),5,0,.4:NEXT:LINE(0
,150)-(30,144),PRESET:LINE(256,1
50)-(226,144),PRESET
20 FORI=18TO60STEP2:LINE(I,192)-
(76,164),PSET:LINE(256-I,192)-(1
80,164),PSET:NEXT:LINE(80,164)-(
176,176),PRESET,BF:LINE(70,180)-
(186,192),PRESET,BF:FORI=82TO172
STEP6:PSET(I,164):PSET(I,176):NE
XT:FORI=82TO172STEP2:LINE(I,167)
-(I,173),PSET:NEXT
21 FORI=78TO178STEP20:CIRCLE(I,1
85),3,1,.7:NEXT:FORI=18TO70STEP6
:LINE(256-I,0)-(176,16),PSET:LIN
E(I,0)-(80,16),PSET:NEXT:LINE(82
,2)-(174,18),PRESET,BF:LINE(84,4
)-(172,16),PSET,B
22 GOSUB39:GOTO24
23 LINE(0,A)-(B,A),PRESET:LINE-(
B+1,C),PRESET,BF:LINE-(255-B,C),
PRESET:LINE-(256-B,A),PRESET,BF:
LINE-(256,A),PRESET:RETURN
24 O=1:WW=5:S$(1)="BL6U7R2D7NL2U
3R2FR2ER2D3R2U7L2D3L2HL2GL2":S$(
2)="LHNU2L2NU2LHL2NF4NE4R2ER3ER2
FND2R2ND2RFR2NH4NG4L2GL3GL"
25 R$="U2RFL2RFBR":G(1)=30:G(2)=
127:G(3)=226:H(1)=60:H(2)=75:H(3
)=90:G$(1)="30,":G$(2)="127,":G$
(3)="226,":H$(1)="60":H$(2)="75"
:H$(3)="90":YP=0
26 PMODE4,1:YP=YP+1:PCOPY5TO3:SC
REEN1,1:E=RND(3):F=RND(3)
27 DRAW"BM"+G$(E)+H$(F)+"C1"+S$(
O):ER=ER+1:IFYP<10THEN29
28 DRAW"C1BR2NG8NF8C0NG8NF8C1":P
LAY"O1L255CO3":QS=RND(9):PCOPY6T
O3:IFQS>8THENGOSUB48
29 POKE339,255:IFPEEK(339)=255TH
```

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```
EN35
30 PCOPY5TO3:X=JOYSTK(0):Y=JOYST
K(1):IFX<20THENP=1ELSEIFX>40THEN
P=3ELSEP=2
31 IFY<20THENQ=1ELSEIFY>40THENQ=
3ELSEQ=2
32 LINE(0,94)-(G(P),H(Q)),PSET:L
INE-(0,94),PRESET:LINE(256,94)-(
G(P),H(Q)),PSET::LINE-(256,94),P
RESET:PLAY"L255GC":K=K+1:PCOPY6T
O3:IFK>89THENGOSUB48
33 LINE(174-K,167)-(174-K,173),P
RESET:IFP=E AND Q=F THEN34ELSE36
34 FORW=1TO2:DRAW"C1":FORI=1TO2:
DRAW"S8BM"+G$(E)+H$(F)+"NU7ND7NL
7NR7NE3NF3NG3NH3C0S4"+S$(O):NEXT
I,W:FORW=1TO2:PMODE3,1:SCREEN1,1
:PLAY"O1T1CBCO3":PMODE4,1:SCREEN
1,1:NEXTW:M1=M1+5:M2=M2+2:M3=M3+
(O-1):GOSUB39:O=O+1:YP=0:PCOPY5T
O3:GOTO36
35 FORW=1TO150:NEXTW
36 PCOPY6TO3:GOSUB60:IFER=>150TH
ENGOSUB53
37 IFO>2THENO=1
38 GOTO26
39 IFM1<10THEN41
40 M2=M2+1:M1=0
41 IFM2>9THENM3=M3+1:M2=0
42 IFM3>9THENM4=M4+1:M3=0
43 IFM4>9THENM5=M5+1:M4=0
44 IFM5>9THENM6=M6+1:M5=0
45 IFM6>9THENM7=M7+1:M6=0
46 IFM7=>10THENM7=0
47 DRAW"S8BM83,14"+Q$+Z$(M7):DRA
WQ$+Z$(M6)+Q$:DRAWZ$(M5)+Q$+Z$(M
4)+Q$:DRAWZ$(M3)+Q$+Z$(M2):DRAWQ
$+Z$(M1)+"S4":RETURN
48 K=0:DRAW"C1":FORV=1TO2:DRAW"S
16BM128,84U4E5H3E3BM128,84H9L9H3
BM128,84NL9":DRAW"G6L12NH9E7H2U3
H3BM128,84ND11F10NG3H10R11NF9E2U
4":DRAW"NH4E4F11E3S4":FOREX=1TO3
:PMODE3,1:SCREEN1,0:PLAY"L255O1B
D":PMODE4,1:SCREEN1,1:NEXTEX:DRA
W"C0":NEXTV
49 YP=0:PMODE1,3:SCREEN1,1:PLAY"
L25O1GP70":PMODE0,3:SCREEN1,1:PL
AY"L200BGFDCO3":CLS0:SCREEN0,0:G
OSUB60:PMODE4,1:SCREEN1,1
50 CIRCLE(58+(RL*20),185),3,0,.7
:RL=RL-1:IFRL<=0THEN55
51 GOSUB53:RETURN
52 DRAW"S28BM44,82"+R$+"U2"+E$+"
NR2U2R2BRD2UR2UD2BRU2R2DNL2DBR"+
R$+"U2NR2DBRRDNL2BRU2"+E$+"S4":R
ETURN
53 K=0:DRAW"C2":PMODE3,1:SCREEN1
,0:COLOR3,2:GOSUB52:FORI=82TO172
STEP2:LINE(I,167)-(I,173),PSET:P
LAY"L255CBT255":PCOPY WW TO3:IFW
W=5THENWW=6ELSEWW=5
54 NEXT:DRAW"C1":GOSUB52:PMODE4,
1:SCREEN1,1:GOSUB60:ER=0:RETURN
55 CLS:NS=(M7*10^6)+(M6*10^5)+(M
5*10^4)+(M4*1000)+(M3*100)+(M2*1
0)+M1:PRINT@325,"PRESS ENTER TO
CONTINUE"
56 PRINT@71,"HIGH SCORE";TS:PRIN
T@135,"YOUR SCORE";NS
57 IF NS>TS THEN TS=NS
58 IFINKEY$=CHR$(13)THEN59ELSE58
59 RL=6:M1=0:M2=0:M3=0:M4=0:M5=0
:M6=0:M7=0:GOSUB60:GOSUB39:GOTO2
0
60 DRAW"BM"+G$(E)+H$(F)+"C0"+S$(
O):RETURN
61 PCLEAR6:GOTO3
```

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BUFF THAT JOB Omnitronix Inc. now produces a low-cost, work-horse printer buffer. The RAMJET 256K Print Buffer comes standard with 256K of memory and is designed to connect between the computer and the printer. The unit comes in either serial (RS-232) or parallel versions and is compatible with standard parallel or RS-232 printers. Other features include a pause mode for using single sheets of paper, a UL/CSA approved power supply and a two year warranty. Suggested list price is $269. *For more information contact Omnitronix Inc., P.O. Box 43, Mercer Island, WA 98040, (206) 236-2983.*

* * *

LITERARY FINDS Howard W. Sams & Co. has announced its introduction of two items to the book scene. *The Computer Dictionary*, now in its fourth printing, is a comprehensive dictionary of basic computer terms and a handbook of computer-related topics. The author provides the reader with information on topics including fiber optics, sensors and vision systems. The 576-page book retails for $24.95. *Computer-Aided Logic Design* provides information on the use of computers as a valuable tool in developing and verifying the operation of electronic designs. The book uses examples such as burglar alarms and traffic light controllers as a basis for combining theory and techniques with the application of computer-aided design tools. The book also includes two BASIC listings for a logic simulation program and a logic minimization program designed to run on most personal computers. Suggested retail for the 448-page book is $25.95. *Contact Howard W. Sams & Co., 4300 W. 62nd Street, Indianapolis, IN 46268, (317) 298-5400.*

* * *

CLASSROOM TOPICS Sunburst Communications has released its 1986 catalog of educational software. Offerings include programs designed for the CoCo as well as several other personal computers. Several programs previously unavailable in CoCo versions are now included. *Contact Sunburst Communications, Room DH7, 39 Washington Avenue, Pleasantville, NY 10570-9971.*

* * *

A2D Technical Hardware Inc. has introduced its new SPAD-12 analog-to-digital converter. While this particular converter is intended for IBM and compatible computers, it is usable by any system with a standard RS-232 interface. More importantly, the company's first offering in this area of technology was the introduction of the CCAD-B and the AD-8 converters. The CCAD-B is a 16 channel, 12-bit converter retailing for $119 for either cassette or disk. The AD-8 is an 8 channel, 8-bit converter. It retails for $119 for disk or cassette. The above prices include hardware as well as software. *For more information contact Technical Hardware Inc., P.O. Box 3609, Fullerton, CA 92634, (714) 628-1126.*

* * *

68K POWER PLAY Frank Hogg Laboratory Inc. has announced its introduction of a versatile 68020-based multi-user computer system. The QT 20x system supports up to 28 users and up to 14 megabytes of RAM. The operating system is OS-9/68K. All models have a 12.5 MHz 68020 microprocessor with two megabytes of RAM. For a base price of $3,695 you receive a QT 20x motherboard, one expansion card (four-user, two megabyte), case and supply and one floppy drive. The motherboard accepts up to seven expansion cards. You receive the same system with an added 20-megabyte hard drive for $4,495. For those wanting to put more power under the hood of their IBM cases, FHL is also carrying an IBM upgrade option. For $2,995 you get the motherboard and expansion card to replace the motherboard you presently have. All drives and devices connected to the SASI ports on these systems are DMA. *Contact Frank Hogg Laboratory Inc., 770 James Street, Syracuse, NY 13203, (315) 474-7856.*

* * *

ACROSS THE SEAS Hayes Microcomputer Products has announced that it will begin marketing the Smartmodem 2400(tm), 2400B(tm) and Transet 1000(R) (128K RAM) in Singapore and will begin shipments of Transet 1000 (128K RAM) to the United Kingdom and Hong Kong. Both modems operate at 2400 bps, 1200 bps, or 0-300 bps over dial-up or leased lines and are compatible with all Hayes, Bell 103/212A, and CCITT V.22 and V.22bis modems. They also provide adaptive equalization, call process monitoring, and diagnostics and testing. The modems have received Singapore Telecom approval and join the Smartmodem 1200(tm), Smartmodem 1200B(tm), and Smartcom II(R) communications software as part of the Hayes Pacific Basin product line.

* * *

ACCESSORIES 3M has introduced 20 new products to its line of computer accessories. 3M accessory products are designed for four primary product or service areas: diskettes, data cartridges, printers and computer care. The new additions augment each area. Eleven of the products are in the diskette area. The most unique is DataSaver(tm) disk filer, a hard plastic storage box for up to ten 5¼-inch diskettes. The unit mounts on the side of the CRT monitor or any other vertical surface. Other notable products include a two-piece universal printer stand and a multi-positional, non-magnetic copy holder (great for typing in listings from THE RAINBOW). *For further information contact 3M, P.O. Box 33600, St. Paul, MN 55133-3600.*

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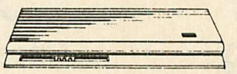

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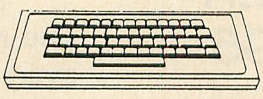

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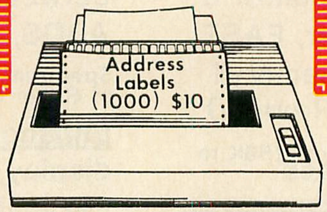

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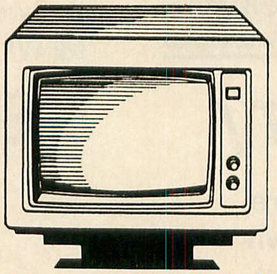

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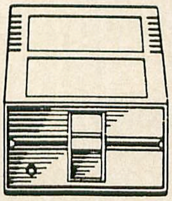

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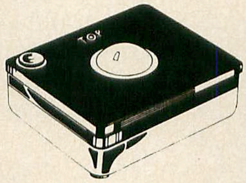

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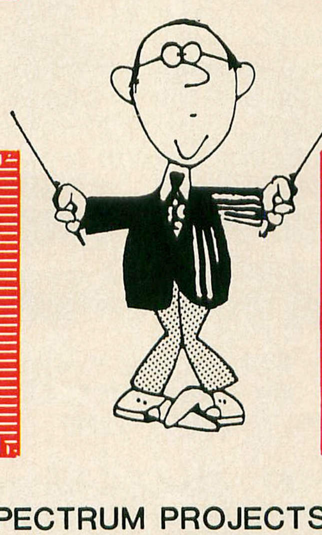

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By Tony DiStefano
Rainbow Contributing Editor

This month I'm looking deeply into a PIA. The letters PIA stand for Peripheral Interface Adapter. The Color Computer uses two of the PIAs. The older, regular CoCo uses two MC6821 PIAs. The newer CoCos and the CoCo 2s use one MC6821 and one MC6822. The differences between the two are minor. The 6822 is called an IIA. This stands for Industrial Interface Adapter. Both have the same pinout and function in the same way. I will describe the differences between them later in this article.

It's interesting to know what PIA stands for, but what does it do? A PIA provides the means of interfacing external hardware or devices to a computer. In our case, the MC6809 CPU. Most devices do not conform to the specifications of a CPU. Take, for instance, a switch. That's right, an everyday household switch. It turns on the lights, stove, radio and so forth. It works well, but is not computer compatible. This is where a PIA comes in. It's a go-between from the CPU to the switch. With a PIA and a little circuit, the CPU can tell if the switch is on or off. Or in CPU terms, a zero or a one. This is known as an input. If the computer had to control a light or a motor, a PIA would be used to switch a transistor on or off and, in turn, the transistor would control a relay and the relay would turn the motor on or off. This is known as an output.

This particular PIA has two bidirectional eight-bit peripheral data buses for interface to external devices and four individually controlled interrupt input lines, two of which can be used as outputs. It also has programmed controlled interrupt and interrupt disable capability plus two control registers and two data direction registers.

The PIA, like many other devices, looks like memory to the CPU. Therefore, the PIA must have address lines, data lines and control lines such as chip enable and read/write. Figure 1 shows the pinout of an MC6821 PIA chip. You should, by now, recognize many of the pins and their names. The following is a pin-by-pin description of this chip.

Vss — Signal ground. A reference to which all other signals are measured.

PA0 to PA7 — The first eight peripheral data lines, which can be programmed as outputs or inputs.

PB0 to PB7 — The second eight peripheral data lines, which can be programmed as outputs or inputs.

CB1 — Is an input only line that sets the interrupt flags of the B control register.

CB2 — Is either an interrupt input line

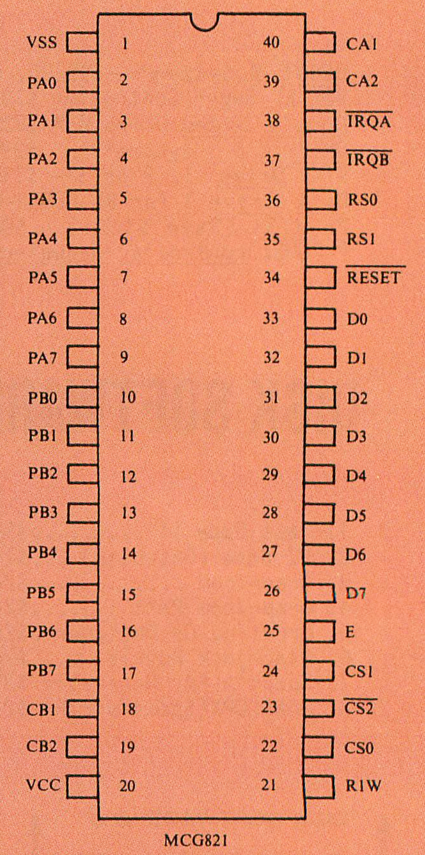

Figure 1

Tony DiStefano is well-known as an early specialist in computer hardware projects. He lives in Laval Ouest, Quebec.

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or a peripheral control output line.

Vcc — This is the five volt input that powers the chip.

R/W — This input controls the PIA as a read or a write to the registers.

CS0 — Chip Select 0 is an active high input. When this pin is low the chip is disabled.

CS2 — Chip Select 2 is an active low input. When this pin is high, the chip is disabled.

CS1 — Chip Select 1 is an active high input. When this pin is low, the chip is disabled.

E — This is the Enable clock or the 'E' clock. Used to enable input or output.

D7 to D0 — These are the eight data lines that the CPU uses to read and write data to the PIA.

RESET — This active low input initializes the PIA to power up conditions.

RS1 — This input is the second address line used to access one of four locations on the PIA.

RS0 — This input is the first address line used to access one of four locations on the PIA.

IRQB — This active low output is used to generate an interrupt to the CPU from port B. The method of interrupt depends on how the control register is set up.

IRQA — this active low output is used to generate an interrupt to the CPU from port A. The method of interrupt depends on how the control register is set up.

CA2 — Is an input only line that sets the interrupt flags of the B control register.

CA1 — Is either an interrupt input line or a peripheral control output line.

First let me talk about the structure of the PIA. Basically, there are two ports. Each port has two control lines. Each PIA has two address lines and takes up four memory locations in the CPU's memory map.

RS1	RS0	Register Bit		Location Selected
		CRA-2	CRB-2	
0	0	1	x	Peripheral Reg. A
0	0	0	x	Data Direction Reg. A
0	1	x	x	Control Reg. A
1	0	x	1	Peripheral Reg. B
1	0	x	0	Data Direction Reg. B
1	1	x	x	Control Reg. B

Table 1: Internal Addressing

BITS	7	6	5	4	3	2	1	0
CRA	IRQ A1	IRQ A2	CA2 Control			DDR A	CA1 Control	
CRB	IRQ B1	IRQ B2	CB2 Control			DDR B	CA2 Control	

Table 2: Control Registers

Table 1 shows the memory map of a PIA. Address locations 0 and 2 are ports A and B respectively. Address locations 1 and 3 are control registers A and B respectively. I hope by now you can recognize addresses by binary bits. It may be a little confusing as to what CRA2 and CRB2 have to do with the memory map. There are actually six registers to a PIA. But, if you remember your binary math, six is not an even power.

The designers could have added another address line and wasted the other two address locations. But instead, they put a software switch in the control register. Bit 2 to be exact. When the switch (bit 2) is low (zero) then address 0 or 2 becomes a data direction register. If you write a one in any bit position in that register, that bit becomes an input. On the other hand, if you write a zero, that bit becomes an output.

After all bits have been selected as ins or outs, then turn the switch at CRA2 or CRB2 back to a one. Now the 0 and 2 addresses become input and output peripheral ports as programmed.

The next part of the PIA is a little more complex. This includes control bits and interrupts. Along with the two eight-bit ports, this PIA also has four other pins. There are two pins used for inputs or outputs and there are two pins that are inputs only. These four pins work in conjunction with the bits in the control register of the PIA. Table 2 explains the bit names of control register A (CRA) and control register B (CRB).

Let's look at CA1 and CB1 first. They are inputs only. On given conditions, these inputs generate an interrupt. Bits 0 and 1 in the respective control registers have the following influence on the interrupts. If bits 0 and 1 are both low (either register), the interrupts are disabled and no interrupts go through. Only the interrupt flags are set on the falling edge of the input. If bit 1 is low and bit 0 is high, the falling edge of the CA1 or CB1 input causes an interrupt and sets the flag. Bit 1 high and bit 0 low sets the flag on the rising edge of the input but does not cause an interrupt. Bit 1 high and bit 0 high causes an interrupt and sets the flag on the rising edge of the input. The CA1 and CB1 interrupt flags are on bit 7 of the respective control byte. In other words, bit 1 enables or disables the interrupts and bit 0 controls on which edge the input causes an interrupt.

Bits 3, 4 and 5 of the control byte control the CA2 and CB2 pins. These pins are a little more flexible than the CA1 and CB1 pins. They can be outputs or inputs controlled by bit 5. If bit 5 (on either control byte) is high, then the pin is an output. If it is low, then it is an input. When bit 5 is low, bits 4 and 3 make these pins behave exactly like bits 1 and 0 make pins CA1 and CB1 behave. When CA2 or CB2 are initialized as outputs, they behave a little differently.

Let's look at CA2 first. There are four possible combinations of operation. The first is when bit 4 is low and bit 3 is low. This goes low after the first negative transition of the E clock after the CPU reads Port A. It returns high when the interrupt flag is set (CRA-7) by the active transition of the CA1 signal. If bit 4 is low and bit 3 is high, it is the same, but goes high after the first 'E' clock cycle. This mode is used mainly as an acknowledgment of a read (handshaking) to another peripheral. If bit 4 is high and bit 3 is low, CA2 is low. If bit 4 is high and bit 3 is high, CA2 is high. This mode is used when CA2 is to be used as a latched bit to control an external device.

Next there is CB2. There are also four possible combinations of operation for this output pin. When bit 4 is low and bit 3 is low, this pin goes low on the positive transition of the first 'E' clock as a result of a write to the B port; then goes high again when the interrupt flag bit (CRB-7) is set by an active transition of the CB1 input. When bit 4 is low and bit 3 is high it is the same, but goes high again on the positive edge of the first 'E' clock following that write. This mode is used when there is a need to autostrobe or select an exterior device. If bit 4 is high and bit 3 is low, it causes CB2 to go low and stay low. If bit 4 is high and bit 3 is high, it causes CB2 to go high and stay high. This is another latched bit to control an external device.

In Conclusion

There you have it, the internal workings of a PIA. As I stated before, there are two such beasts in our CoCos and CoCo 2s. If you want to add a third PIA, the most logical place to put it in the memory map would be in the Spare Chip Select area. This is at $FF40 and is 16 bytes long. That is the same place that the contoller is mapped. You could always use a Multi-Pak Interface. You should now know enough about CPUs and signals to interface this PIA to the computer, but for those of you who are still unsure, I have included some guidelines.

Using the pinout of the PIA in Figure 1 and the pinout of the CoCo expansion bus in earlier articles, connect the following signals together. Five volts to five volts. Ground to ground. All eight data lines to all eight data lines. The first two address lines of the CPU to RS0 and RS1 respectively. The R/W line to the R/W line. The 'E' clock to the 'E' clock. The $\overline{\text{RESET}}$ line to the $\overline{\text{RESET}}$ line. The SCS line to the $\overline{\text{CS2}}$ line. And finally, CS0 and CS1 to five volts. You can connect $\overline{\text{IRQA}}$ and $\overline{\text{IRQB}}$ to the cart line of the computer, but watch out, this can (under certain conditions) cause an interrupt that makes the computer crash. Make sure you know what you're doing with the interrupt routines for the CoCo and the setting of the interrupt pins in the PIA.

Submitting Material To Rainbow

Contributions to THE RAINBOW are welcome from everyone. We like to run a variety of programs that are useful/helpful/fun for other CoCo owners.

Program submissions must be on tape or disk and it is best to make several saves, at least one of them in ASCII format. We're sorry, but we do not have time to key in programs. All programs should be supported by some editorial commentary explaining how the program works. Generally, we're much more interested in how your submission works and runs than how you developed it. Programs should be learning experiences.

We do pay for submissions, based on a number of criteria. Those wishing remuneration should *so state* when making submissions.

For the benefit of those who wish more detailed information on making submissions, please send a self-addressed, stamped envelope (SASE) to: Submissions Editor, THE RAINBOW, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. We will send you some more comprehensive guidelines.

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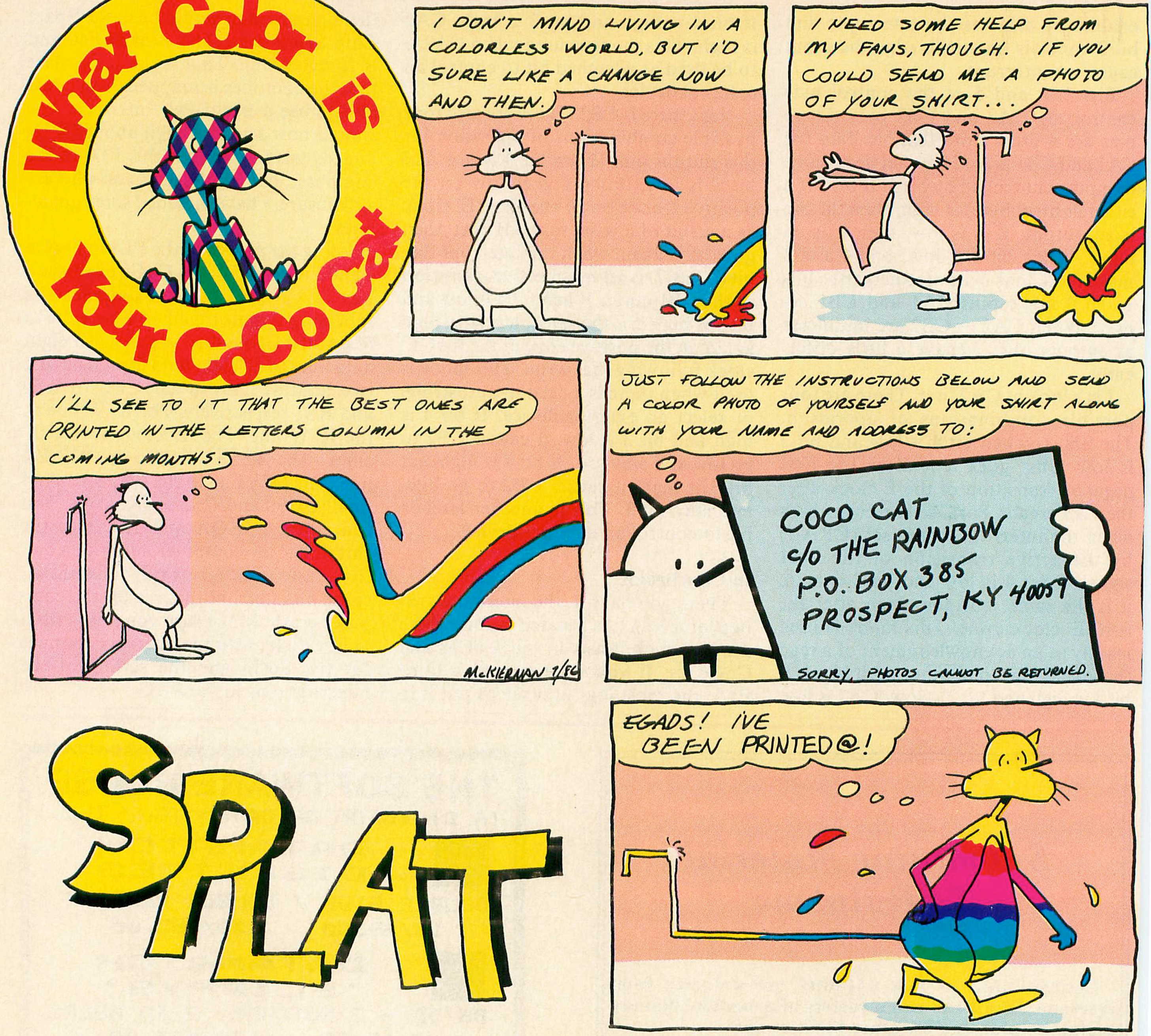
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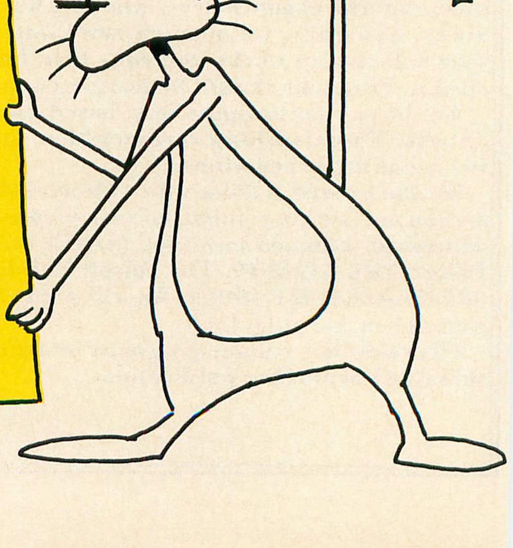
To color your "CoCo Cat" iron-on, you should use a textile paint or marker made especially for that purpose. Your local arts and crafts store would be the best place to find these.

For fabric paints, try "Versatex" textile paint made by Siphon Art or "Deka" permanent fabric paint. If you want to use markers, we suggest "Glad Rags" made by Sanford.

Be sure to place a piece of cardboard inside the shirt to prevent paint bleeding.

For best results, after painting or coloring your shirt and the colors have thoroughly dried, immediately wash it in cold water. To keep the colors from fading, it is best to always wash the shirt in cold water.



July Fashion Forecast: Classic Clothes by CoCo

By Robert C. Montowski

A company in California has special printer ribbons that allow you to print graphics to your printer and then use the printout as an iron-on transfer. This bit of information intrigued me and I thought it would be fun to produce my own iron-on. But I had a problem: Most of my graphics programs do not have a left-to-right flip function in them. I sat down to write one that was fast, simple and could be called from BASIC so even those not familiar with the program could use it.

I finally came up with the *Flip-L2R/BIN* program. It is very compact and is position independent so it can reside almost anywhere in memory. It will handle both PMODE 4 and *CoCo MAX*-size pictures. If the wrong value is passed to *Flip-L2R/BIN*, the picture will not be flipped.

Flip-L2R/SRC is source code from *EDTASM+* you can use to assemble *Flip-L2R/BIN* with any extra features you want to add. If you don't have *EDTASM+*, then use *Flippoke/BAS* to poke the ML code into memory.

Flip-L2R/BIN is the assembled code ready to use. The program *Bootflip/BAS* is a simple program for loading in *Flip-L2R/BIN* and the pictures you want to flip. *Bootflip/BAS* prompts for the name of the picture to load and then asks if the file is a PMODE 4 or *CoCo MAX*-size picture.

The program goes to Hi-Res and shows you the flip in action. Watch closely because the flip only takes one-quarter second. It is about one-half second for a *CoCo MAX*-size picture. If you flipped a *CoCo MAX*-size picture, the program does the flip and shows the PMODE 4,1 and the PMODE 4,5 screens to prove the flip was done right.

After the flip is done, the program prints how to save the new picture to disk and then ends. This is to give better control over which disk the new program is to be saved on and under what name. To use the program again, type GOTO 20.

To order those special print ribbons, call Underware Diversions Inc. at (415) 591-0660 or they can be reached at 1550 Winding Way, Belmont, CA 94002. The ribbons cost about $20 and are available for Apple Imagewriter, Epson, Okidata and Gemini printers.

You must have your own screen dump program to get the flipped picture to the printer. The company also sells colored markers to color in the iron-on.

(Questions about this program may be directed to the author at B-18 1151 Sterigere Street, Norristown, PA 19403, phone 215-277-6951. Please enclose an SASE when writing.) □

Bob Montowski works as a security aid for the Pennsylvania state hospital and lives in Norristown. He is an avid OS-9 user and runs an OS-9 BBS called The Graphics Pub.

Listing 1: BOOTFLIP

```
1 CLEAR 200,&H7E00:LOADM"FLIP-L2
R/BIN"
2 PCLEAR 8
10 DEFUSR0=&H7E15
20 PMODE 4,1
21 PCLS:CLS:LINE INPUT"NAME OF P
IX TO LOAD? ";N$
22 PRINT"1. PMODE 4":PRINT"2. CO
CO MAX SIZE":PRINT"WHICH FORMAT
IS PICTURE ";:INPUT N
30 SCREEN 1,1
40 LOADM N$
50 FORI=1TO2000:NEXT
60 A=USR0(N)
70 SOUND 100,10
81 IF N=2 THEN PMODE 4,1:SCREEN
```

```
1,1:FOR I=1 TO 1000:NEXT:SOUND 1
00,20:PMODE 4,5:SCREEN 1,1:FORI=
1 TO 1000:NEXT:SOUND 200,20:CLS:
PRINT"PICTURE HAS BEEN FLIPPED!"
82 IF N=1 THEN CLS:PRINT"SAVE TO
 DISK AS:":PRINT"SAVEM"+CHR$(34)
+"NAME"+CHR$(34)+",&HE00,&H25FF,
40999"
84 IF N=2 THEN CLS:PRINT"SAVE TO
 DISK AS:":PRINT"SAVEM"+CHR$(34)
+"NAME"+CHR$(34)+",&HE00,&H3DFF,
40999"
90 PRINT"TYPE GOTO 20 TO RUN AGA
IN"
```

Listing 2: FLIPPOKE

```
2 'A BASIC PROGRAM TO POKE FLIP-
L2R/BIN
4 'INTO MEMORY FOR THOSE WITHOUT
 EDTASM+
5 'BOB MONTOWSKI
6 'APT B-18 1151 STERIGERE ST.
7 'NORRISTOWN, PA. 19403  71615,
531
8 '
9 '
10 CLEAR 200,&H7E00
11 CLS:PRINT"POKING M/L INTO MEM
ORY NOW..."
20 FOR I=&H7E00 TO &H7EBE
30 READ N:POKE I,N
31 PRINT@32,I;" ";N
40 NEXT I
41 PRINT:PRINT"M/L CODE IN MEMOR
Y":PRINT"HIT ANY KEY TO SAVE COD
E TO DISK"
42 I$=INKEY$:IF I$=""THEN 42
50 SAVEM"FLIP-L2R/BIN",&H7E00,&H
7EBE,&H7E15
60 END
100 DATA 0,8,4,12,2,10,6,14,1,9
110 DATA 5,13,3,11,7,15,15,0,1
120 DATA 248,255,79,95,189,179,2
37,16,131
130 DATA 0,1,16,37,0,155,16,131,
0
140 DATA 2,16,46,0,147,193,1,38,
11
150 DATA 142,14,0,204,0,192,237,
140,217
160 DATA 32,9,142,14,0,204,1,128
,237
170 DATA 140,206,18,16,142,0,33,
230,0
180 DATA 231,140,198,196,15,51,1
40,175,166
190 DATA 197,72,72,72,72,167,140
,186,230
200 DATA 140,181,84,84,84,84,166
,197,171
210 DATA 140,174,167,140,169,49,
62,52,32
220 DATA 166,97,230,134,231,140,
159,196,15
230 DATA 166,197,72,72,72,72,167
,140,149
240 DATA 230,140,145,84,84,84,84
,166,197
250 DATA 171,140,137,167,140,133
,230,140,129
260 DATA 166,97,231,134,230,141,
255,122
270 DATA 231,0,48,1,53,32,16,140
,0
280 DATA 1,46,162,48,136,16,16,1
74,141
290 DATA 255,99,49,63,16,140,0,0
,39
300 DATA 9,16,175,141,255,86,22,
255,134
310 DATA 57,57
```

Listing 3: FLIP-L2R

```
00001 ************************************************************
00002 *BOB MONTOWSKI
00003 *APT. B-18 1151 STERIGERE ST.
00004 *NORRISTOWN, PA.  19403
00005 *71615,531
00006 *(C) 1985
00007 ************************************************************
00008 *THIS PROGRAM IS RELOCATABLE POSITION INDEPENDANT CODE
00010 ************************************************************
00015 *A M/L PROGRAM TO FLIP A PMODE 4 OR COCO MAX SIZE PICTURE
00020 *FROM LEFT TO RIGHT...
00025 *CALL THE PROGRAM FROM BASIC WITH THIS ROUTINE
00027 *05 PCLEAR 8
00030 *10 CLEAR 200,&H7E00
00035 *20 LOADM"FLIP-L2R/BIN"
```

```
                    00040 *30 DEFUSR0=&H7E15
                    00045 *40 LOADM"PICTURE/BIN"
                    00055 *55 REM N=1 FOR DISK SYSTEM AND PMODE 4 PICTURE
                    00065 *65 REM N=2 FOR DISK SYSTEM AND COCO MAX SIZE PICTURE
                    00070 *70 A=USR0(N)
                    00075 *75 REM FLIP IS DONE NOW DO A (C)SAVEM OF THE NEW PICTURE
                    00076 * (C)SAVEM"PIC/BIN",&HE00,&H25FF,40999
                    00077 * FOR PMODE 4 PIC ON DISK SYSTEM
                    00078 * (C)SAVEM"PIC/MAX",&HE00,&H3DFF,40999
                    00079 * FOR COCO MAX SIZE PIC ON DISK SYSTEM
                    00080 ***********************************************************************
                    00085 ***********************************************************************
7E00                00100         ORG     $7E00
                    00101 *MIRROR IMAGE TABLE FOR BYTE VALUES FROM HEX 0 TO HEX F
7E00      00        00105 TABLE   FCB     $00      MIRROR OF HEX 0
7E01      08        00110         FCB     $08      MIRROR OF HEX 1
7E02      04        00115         FCB     $04      MIRROR OF HEX 2
7E03      0C        00120         FCB     $0C      MIRROR OF HEX 3
7E04      02        00125         FCB     $02      MIRROR OF HEX 4
7E05      0A        00130         FCB     $0A      MIRROR OF HEX 5
7E06      06        00135         FCB     $06      MIRROR OF HEX 6
7E07      0E        00140         FCB     $0E      MIRROR OF HEX 7
7E08      01        00145         FCB     $01      MIRROR OF HEX 8
7E09      09        00150         FCB     $09      MIRROR OF HEX 9
7E0A      05        00155         FCB     $05      MIRROR OF HEX A
7E0B      0D        00160         FCB     $0D      MIRROR OF HEX B
7E0C      03        00165         FCB     $03      MIRROR OF HEX C
7E0D      0B        00170         FCB     $0B      MIRROR OF HEX D
7E0E      07        00175         FCB     $07      MIRROR OF HEX E
7E0F      0F        00180         FCB     $0F      MIRROR OF HEX F
7E10                00190 REPEAT  RMB     2
7E12                00195 LEFT    RMB     1
7E13                00200 RIGHT   RMB     1
7E14                00205 TEMP    RMB     1
7E15 4F             00206 START   CLRA
7E16 5F             00208         CLRB
                    00209 *GET VALUE FROM BASIC AND CHECK TO BE SURE >=1 AND <=2
7E17 BD   B3ED      00210 GETVAR  JSR     $B3ED
7E1A 1083 0001      00215         CMPD    #$0001
7E1E 1025 009B      00220         LBLO     ERROR
7E22 1083 0002      00225         CMPD    #$0002
7E26 102E 0093      00230         LBGT    ERROR
                    00231 ***********************************************************************
7E2A C1   01        00235         CMPB    #$01
7E2C 26   0B        00240         BNE     NV2
7E2E 8E   0E00      00245         LDX     #$0E00  START OF PMODE 4 GRAPHICS/DISK SYSTEM
7E31 CC   00C0      00255         LDD     #192    # OF ROWS ON PMODE 4 PICTURE
7E34 ED   8C D9     00260         STD     REPEAT,PCR
7E37 20   09        00265         BRA     FLIP
7E39 8E   0E00      00280 NV2     LDX     #$0E00  START OF PMODE 4 GRAPHICS/DISK SYSTEM
7E3C CC   0180      00290         LDD     #384    # OF ROWS ON COCO MAX PICTURE
7E3F ED   8C CE     00295         STD     REPEAT,PCR
7E42 12             00360 FLIP    NOP     VARIABLES ARE SET FOR TYPE SYSTEM/TYPE PICTURE
7E43 108E 0021      00365 FLIP2   LDY     #33
7E47 E6   00        00370 FLIP3   LDB     0,X
7E49 E7   8C C6     00375         STB     LEFT,PCR
7E4C C4   0F        00380         ANDB    #$0F
7E4E 33   8C AF     00385         LEAU    TABLE,PCR
7E51 A6   C5        00390         LDA     B,U
```

```
7E53 48             00391          LSLA
7E54 48             00392          LSLA
7E55 48             00393          LSLA
7E56 48             00394          LSLA
7E57 A7    8C BA    00395          STA      TEMP,PCR
7E5A E6    8C B5    00400          LDB      LEFT,PCR
7E5D 54             00405          LSRB
7E5E 54             00410          LSRB
7E5F 54             00415          LSRB
7E60 54             00420          LSRB
7E61 A6    C5       00425          LDA      B,U
7E63 AB    8C AE    00450          ADDA     TEMP,PCR
7E66 A7    8C A9    00455          STA      LEFT,PCR
7E69 31    3E       00460          LEAY     -2,Y
7E6B 34    20       00461          PSHS     Y
7E6D A6    61       00462          LDA      1,S
7E6F E6    86       00463          LDB      A,X
7E71 E7    8C 9F    00470          STB      RIGHT,PCR
7E74 C4    0F       00475          ANDB     #$0F
7E76 A6    C5       00485          LDA      B,U
7E78 48             00486          LSLA
7E79 48             00487          LSLA
7E7A 48             00488          LSLA
7E7B 48             00489          LSLA
7E7C A7    8C 95    00490          STA      TEMP,PCR
7E7F E6    8C 91    00495          LDB      RIGHT,PCR
7E82 54             00500          LSRB
7E83 54             00505          LSRB
7E84 54             00510          LSRB
```

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```
7E85 54               00515          LSRB
7E86 A6     C5        00520          LDA      B,U
7E88 AB     8C 89     00545          ADDA     TEMP,PCR
7E8B A7     8C 85     00550          STA      RIGHT,PCR
7E8E E6     8C 81     00555          LDB      LEFT,PCR
7E91 A6     61        00560          LDA      1,S
7E93 E7     86        00561          STB      A,X
                      00562
                      00563
7E95 E6     8D FF7A   00565          LDB      RIGHT,PCR
7E99 E7     00        00570          STB      0,X
7E9B 30     01        00575          LEAX     1,X
7E9D 35     20        00576          PULS     Y
7E9F 108C   0001      00580          CMPY     #$0001
7EA3 2E     A2        00585          BGT      FLIP3
7EA5 30     88 10     00590          LEAX     16,X
7EA8 10AE   8D FF63   00595          LDY      REPEAT,PCR
7EAD 31     3F        00600          LEAY     -1,Y
7EAF 108C   0000      00601          CMPY     #$0000
7EB3 27     09        00605          BEQ      FINI
7EB5 10AF   8D FF56   00610          STY      REPEAT,PCR
7EBA 16     FF86      00615          LBRA     FLIP2
                      00617 *MY ERROR ROUTINE IF D<1 OR D>2 IS TO JUST RETURN TO BASIC
                      00618 *YOU MAY ADD YOUR OWN CODE HERE TO PRINT AN ERROR MESSAGE
                      00619 *BEFORE RETURNING TO BASIC
7EBD 39               00620 ERROR    RTS
7EBE 39               00625 FINI     RTS
            0000      00630          END

00000 TOTAL ERRORS
```

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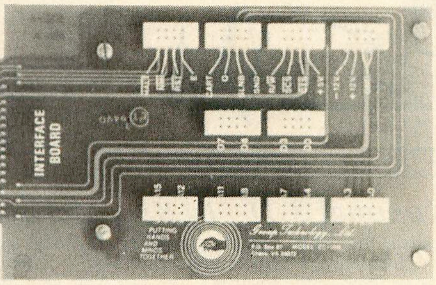

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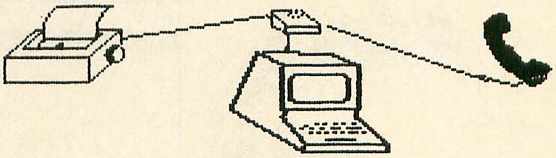

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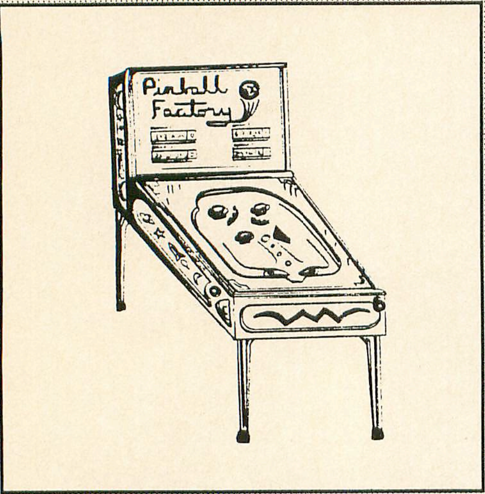

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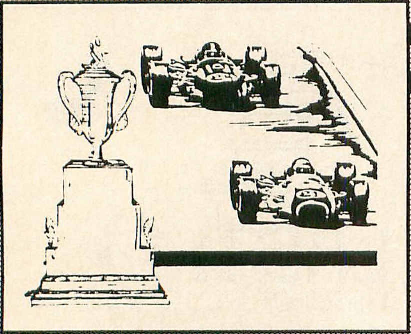

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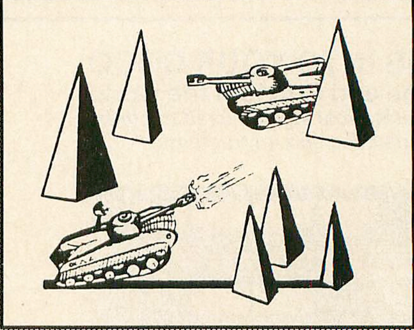

Rommel 3-D by Kary McFadden

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CoCo Mouse!

By Steve Bjork

In the past 15 years I have seen the user interface for computers improve greatly. First I used punch cards to enter my programs into a computer. Next came the hard copy terminal, but it was like using a typewriter (very slow and noisy). Now finally, the home computer with its display and keyboard makes for faster, quieter and easier user interface.

True, we have come a long way since the punch card, but the keyboard is not always the best way to talk to a computer. An example is the game *Mega-Bug*; you can use the keyboard's arrow keys to control the game, but the joystick makes it easier to play the game.

The same is true for most programs written in BASIC. Moving a pointer on the screen to select an option from the menu is more user friendly than looking at the screen, then pressing keys to tell the computer what to do.

This is where *The Mouse* comes in. It uses a Color Computer mouse (or joystick) as a point-and-click user interface. By moving the mouse, a pointer (cursor) is moved around on the screen. When the cursor is over the option wanted, press the button on the mouse to select it. No more looking away from the screen to hunt for keys to enter your selection.

About a year ago I placed in public domain my first version of *The Mouse* Version 1.0. After receiving many requests for a few options to be added, Version 2.0 of *The Mouse* is ready for release.

The Mouse is an assembly language program that displays a moving cursor and prints upper- and lowercase text on the Hi-Res graphics screen. This Hi-Res text driver has a format of 32 columns by 24 lines with a scroll-protect window option. Bell and click sounds also have been added to round out the package.

Software Overview

The Mouse communicates with a BASIC program via a `USR` function and the `PRINT` command. The 60-hertz interrupt is used to draw the cursor on the screen and read the joystick's position and button status. *The Mouse* can poll the right or left joystick ports, *CoCo Max* Hi-Res input module, the Radio Shack *X-Pad* or the Hi-Res Joystick Convert for the cursor position and button status. The `PRINT` command is redirected from the standard green text screen to a Hi-Res screen text driver whenever the Hi-Res screen is displayed. The `USR` function has 14 commands that can be passed to it. They are:

USR(0) — This command turns off the cursor (pointer) on the screen. Make sure the cursor is off before using any BASIC graphics commands.

USR(1) — This command turns the cursor on. The cursor should only be on when a selection is to be made from the screen.

USR(2) — This function returns the X position of the cursor (and the joystick).

USR(3) — This function returns the Y position of the cursor (and joystick).

(Note: Because the Color Computer joystick port uses a six-bit DAC system, they only return a value of zero to 63. To get full-screen movement of the cursor, the zero to 63 from DAC is multiplied by two for zero to 126 across, or multiplied by three for zero to 189 up and down. The *CoCo Max* hardware, *X-Pad* and Hi-Res Joystick Interface options return a full 128 by 192 reading.)

Steve Bjork has been a programmer for over 15 years. In his association with DataSoft he has authored such programs as Zaxxon, Sands of Egypt *and* Mega-Bug. *He now handles product development for his own company, SRB Software, and has produced* Stellar Life Line, Ghana Bwana *and* PitFall II *among others. Steve lives in Simi Valley, California*

USR(4) — This function is used to find out if the button has been pressed. A zero is returned if the button has not been pressed since the last time the command was used. A one is returned if it was pressed.

USR(5) — This function returns the up/down status of the button. A zero is passed if the button is not pressed or a one if the button is pressed.

USR(6) — This command is used to unlink (turn off) *The Mouse* system. This command *must* be used when ending the BASIC program. When any other command is used, *The Mouse* is automatically linked into the Color Computer system.

USR(7) — This command plays a bell sound.

USR(8) — This command plays a click sound.

USR(9) — This command selects the right joystick as the input device for cursor movement and button status. This is the standard input device for *The Mouse* and is automatically selected when *The Mouse* binary file is loaded into memory.

USR(10) — This command selects the left joystick for cursor position and button status.

USR(11) — This command selects the *CoCo Max* Hi-Res Input Module for cursor position and button status.

USR(12) — This command selects Radio Shack *X-Pad* for cursor position and button status.

USR(13) — This command selects Hi-Res Joystick Interface for cursor position and button status.

Tables 1 and 2 are for quick reference of the `USR` commands and the screen control code for the Hi-Res screen text drivers.

To make the binary file of *The Mouse*, type in Listing 1 and save it. Now run the program. If an error is encountered in one of data lines the program prints the line number and stops. After all the data lines have been converted, the program asks if the binary file should be saved to tape or disk.

The disk version of *The Mouse* binary file has a load address of zero and needs an offset address whenever it is loaded into memory. To load this file in the end of memory of a 16K system, a load offset address $3400 should be used (`LOADM "MOUSE",&H3400`).

The cassette version has a starting address of $3400 and ending address of $3FFF. If the file is loaded on a 32/64K system, a load offset of $4000 will put it at the top of memory ($7400 to $7FFF).

Using the Mouse Software

Now that you have an idea of what the commands are, let's see how to use them. *Lines* (Listing 2) is a BASIC program that uses *The Mouse* to draw lines on the screen by selecting the start and end points. The program also has the option to exit or clear the screen.

Line 100 clears space for *The Mouse* and Line 120 loads it in. Note: this program is configured for loading in *The Mouse* from disk. If you are using this program on a casette-based system, delete Line 120 and remove the apostrophe (') from Line 140.

Table 1
`USR` commands

0 Turn off Hi-Res cursor.
1 Turn on and display Hi-Res cursor.
2 Get Joystick X position (0 to 127).
3 Get Joystick Y position (0 to 191).
4 Get button press. If button was pressed, senses the last use of this command and a -1 is returned. Else a 0 is returned.
5 Get button status. The number -1 is returned if the button is pressed down. Else a 0 is returned.
6 Disable *Mouse* software, unlink its hooks.
7 Play Bell sound.
8 Play Click sound.
9 Select right Joystick for input device.
10 Select left Joystick for input device.
11 Select *Coco Max* Hardware for input device.
12 Select Radio Shack *X-Pad* for input device.
13 Select Hi-Res Joystick Interface for input device.

Line 150 defines `USR` function zero with *The Mouse* address. The next line tells BASIC to clear and display a 6K Hi-Res screen.

To make easy use of the scroll-protect windows, lines 170 through 180 define three types, full screen, top line and

240	151	1250	88
1010	181	1310	163
1070	159	1360	2
1130	242	1420	126
1190	3	END	68

Listing 1: `MOUSE`

```
0 GOTO 2000
10 'THIS PROGRAM MAKES A MOUSE
20 'BINARY FILE
30 'COPYRIGHT 1986 BY SRB SOFTWA
RE
40 'THIS IS A PUBLIC DOMAIN
50 'SOFTWARE BY STEVE BJORK
100 CLEAR 50,&H33FF
110 MOUSE=&H3400
120 CLS:P=MOUSE:LN=1000
130 READ L$,C:S=0
140 PRINT @0,"WORKING ON LINE";L
N
150 FOR X=0 TO 63
160 V=VAL("&H"+MID$(L$,X*2+1,2))
170 POKE P,V:S=S+V:P=P+1
180 NEXT X
190 IF C<>S THEN PRINT "DATA ERR
OR IN LINE";LN:END
200 LN=LN+10:IF P<MOUSE+&HBFF TH
EN 130
210 CLS:PRINT"SAVE TO DISK OR CA
SETTE? (D,C)
220 I$=INKEY$:IF I$="D" THEN 300
 ELSE IF I$<>"C" THEN 220
230 PRINT "PRESS ENTER WHEN READ
Y TO SAVE  TO CASSETTE."
240 IF INKEY$<>CHR$(13) THEN 240
250 CSAVEM"MOUSE",MOUSE,MOUSE+&H
BFF,&HA027
260 PRINT"MOUSE BINARY FILE IS N
OW ON THE TAPE."
270 PRINT"THE LOAD ADDRESS IS $3
400-$3FFF"
280 END
```

Table 2
Screen Control Codes

0	Nil, do nothing.
1	X-position, Y-position — Set cursor position.
2	Select white on black characters.
3	Select black on white characters.
4	X-position, Y-position, X-length, Y-length — Set window position and size.
5	Move text cursor left
6	Move text cursor right.
7	Play bell sound.
8	Backspace.
9	Move cursor to next tab position.
10	Move down one line with scroll (line feed).
11	Move up one line.
12	Clear screen and home cursor (form-feed).
13	Carriage return.

14 to 31 and 128 to 255 are not defined at this time.

32 to 127 are printable characters.

draw area. Information for window placement and size is pasted to *The Mouse* by printing a control code number four and four bytes of data. The format is: 4, X-position, Y-position, X-length, Y-length. The X-position is any of the first 31 columns (0-30). The Y-position is any of the first 23 lines (0-22). The X-length is from 1 to 32 (X-position) in size. The Y-length is from 1 to 24 (Y-position) in size.

After using any of the `USR` functions *The Mouse* is linked in the `PRINT` command and the 60-hertz interrupt and that's what the `USR(0)` in Line 190 does. Lines up to 260 print the instructions to the program. Line 270 waits for the user to press the button to continue. The `GOSUB` in Line 500 clears the work area.

After turning on the cursor, the computer waits for the user to press the button to place the starting point of the line. This is done in lines 290 through 350. Next comes the end point selection by pressing the button one more time after moving the cursor on the screen (lines 360 to 400).

The interrupting of the cursor points on the screen is done by the subroutine at lines 410 to 490. If the cursor point selected (by pressing the button) is on the work area, then the X and Y location is returned. If the Clear option is selected, the screen is erased to black. If the Exit option is selected, the program unlinks *The Mouse* from the system and ends the program in lines 520 through 530.

Whenever the screen is changed by drawing a line, clearing the screen or placing a dot, the cursor must be turned off and then turned back on after all changes are made. The reason for this is the cursor makes a copy of the area underneath before drawing on the screen. When it is turned off or moved, the old area is restored. The *Lines* program is good for demonstrating *The Mouse*, but not much else.

Now let's look at real application of the point-and-pick user interface, the *Disk Drive Timer*. This program (Listing 3) makes extensive use of *The Mouse* and icons.

After running the programs, you see four disks on the screen. Each disk represents disk Drive 0 to 3. To test the speed of a disk drive, first select the disk icon representing the drive by moving the cursor (arrow) over the disk and pressing the button. The computer tests to see if the disk drive is *online* with a disk in it. If there is no error, then that disk drive's icon is inverted to show it is the selected drive.

At the bottom of the screen is the command menu with three options. First is the Disk Speed History. This command builds a bar graph of the drive's speed over a long period of time. Press the button to exit this command.

Next is the Adjust Speed command. This command displays in real time the speed of the drive. Again, press the button to exit this command.

The last is the Exit command. This unlinks *The Mouse* and exits the program.

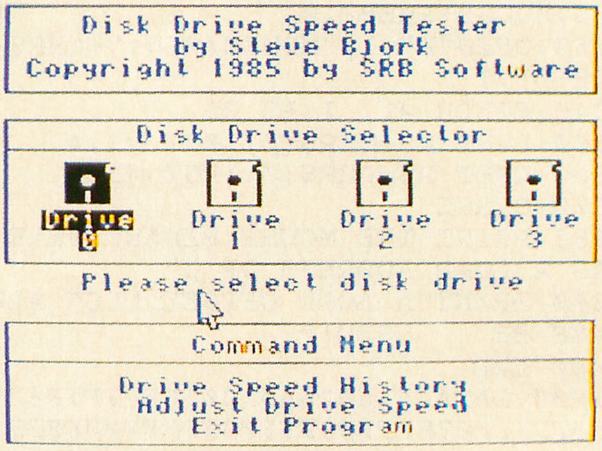
Now that you understand how to use *The Mouse*, let's see what you can write! Send those programs (along with documentation) to THE RAINBOW or upload them to RAINBOW'S CoCo SIG on Delphi.

So much for this month, next time we'll look at how *The Mouse* works by taking a peek at its assembly language source code.

(You may contact the author about any questions at 2529 Ellington Court, Simi Valley, CA 93063, phone 805-583-5166. Please enclose an SASE when writing.) ☐

```
290 'THESE LINES ARE FOR DISK
300 INPUT"WHAT DRIVE SHOULD THE
FILE BE   SAVED TO";D
310 IF D<0 OR D>3 THEN 300
320 SAVEM"MOUSE:"+CHR$(48+D),MOU
SE,MOUSE+&HBBF,0
330 OPEN"R",1,"MOUSE/BIN:"+CHR$(
48+D),1
340 FIELD #1, 1 AS R$
350 LSET R$=CHR$(0):PUT #1,4
360 LSET R$=CHR$(0):PUT #1,5
370 CLOSE
380 PRINT"THE MOUSE BINARY FILE
AS A LOAD ADDRESS OF 0"
390 PRINT"A LOAD OFFSET MUST ALW
AYS BE   USED!"
400 END
1000 DATA "16025A01003FFFFF1FFFF
F0FFFFF07FFFF03FFFF01FFFF00FFFF0
07FFF003FFF001FFF001FFF00FFFF30F
FFFF87FFFF87FFFF87FFF0000004000
0600007000",8307
1010 DATA "0078000007C00007E00007
F00007F80007FC0007C00004600000060
00003000003000000000CFFFFFC7FFF
FC3FFFFC1FFFFC0FFFFC07FFFC03FFFC
01FFFC00FFF",6837
1020 DATA "C007FFC007FFC03FFFCC3
FFFFE1FFFFE1FFFFE1FFF0000001000
0180001C00001E00001F00001F80001
FC0001FE0001FF0001F00001180000018
00000C00000",5094
1030 DATA "C000000000F3FFFFF1FFF
FF0FFFFF07FFFF03FFFF01FFFF00FFFF
007FFF003FFF001FFF001FFF00FFFF30
FFFFF87FFFF87FFFF87FF0000000400
0060000700",9629
1040 DATA "000780000007C00007E0000
7F00007F80007FC0007C000046000006
00000300000300000000FCFFFFFC7FF
FFC3FFFFC1FFFFC0FFFFC07FFFC03FFF
C01FFFC00FF",6882
```

```
1050 DATA "FC007FFC007FFC03FFFCC
3FFFFE1FFFFE1FFFFE1FF00000001000
00180000 1C00001E00001F00001F8000
1FC0001FE0001FF0001F000011800001
800000C0000",6279
1060 DATA "0C00000000023E0169015
B015E0161016602A004690 4B402B402B
402B402B402B40000000000000000000
00000000000000FFFF00000000000000
00000001820",2501
1070 DATA "000000000000000000000
00000000000000000000000000000000
00000000000000000000000000000000
00000000000000000000000000000000
00000000000",0
1080 DATA "000000000000000000000
00000000000000000000000000000000
00000000000000000000000000000000
00000000000000000000000000000000
00000000000",0
1090 DATA "000000000000000000000
00000000000000000000000000000000
000003410308D01DBBC010D351027513
476FC010D338DFF3EED4117021FED523
08D01C0BF01",3064
1100 DATA "0DFC0168ED43308D041EB
F01686F5DBE0123F60120C135262031 8
DFF5658AF4710BF0123A680A7A05A26F
9EC8DFF52ED49308D03A4AF8DFF48357
64D2624BDB3",7037
1110 DATA "ED1083000E221B3474338
DFEE4318DFEB458ECA531AB3504ADA43
5704F7EB4F4E65339E65239E6556F553
9E65439340 11A50E651CA40E7518D023
581E6512BED",7464
1120 DATA "C54027E934411A50CA80E
751308DFCF3318DFEADEC52A080E0806
F5A81B02406C1742402635A34041F138
1C53401250140C6203D350125054353C
300019BBA1F",6433
1130 DATA "01E6E45757E78DFE5F308
5AF8DFE5A350284 03C6603D33CB8610E
68DFE4D26379CBA2529345286 03E68DF
E3CC1202413 9CB7240F3402A684A7A0A
4C4A8C830A7",7607
1140 DATA "8435023001 33415C4A26E
135523088203 3434A26CB35C1A78DFE0
6EC84EDA1A4C4A8C830E441E8C831ED8
1A684A7A0A442A8C832A784334330881
E6A8DFDE226",7729
1150 DATA "DA35C134011A50E651C4B
FE7518D0235813401 1A50E6512AF6C47
FE751318DFDE0AE58861 0E65A26299CB
A251D3412E657860 3A750C1202408 9CB
72404A6A0A7",7149
1160 DATA "8430015C6A5026ED35123
08820 4A26D93581A750ECA1ED81E6A0E
7843088 1E6A5026F1358117FF9BAE41B
F010DEC43FD0168EC47FD01235F39C00
9E75F39338D",7218
1170 DATA "FD6FAE45A640AA5181402
70FAC5227123410 17FF7C3510A640260
7AF5217FE9C2006E6402702 6A40308C0
73410347F6ED8018D23ED45E654A6562
7075D26096A",5802
1180 DATA "5620095D2706E755860 2A
7563B009D009D013D011000 14A65F483
08CF0EC866E8B4F8D6DEC52634F2B428
EFF00A68823E6882034068 4F7A78823A
601E603340 6",6121
1190 DATA "C4F7E7038A08A7018D238
6C03D3402A60184F7A7018D165435021
F023506A701E7033506E78820A788231
F2039340186FFA7882086 2D4A26FDCC0
27E1A50A788",6096
1200 DATA "205A26FDA6842B0712121
25C26F65A358134028EFF00A602C6FFE
70235045C53EA84A70253C403E75439A
65F8DE334408EFF00A68823E688201F0
284F7A78823",6816
1210 DATA "A601E6031F038A08A701C
4F73404E68DFC5E585858EAE0E7038D2
2860 33D3404A60184F7A7018D1558340
41F30E703A7011F20E78820A78823350
435C2CC4080",6350
1220 DATA "3402CA02E78820C802A68
42B04E0E42002EBE43502448101 26E65
45439F6FF6054B6FF613406F6FF62C50
22607EC52EDE45F2010C5042704A653A
761C5082704",6946
1230 DATA "A652A7E4C401E75435863
4068EFF908D158D13C6C03DA7E48D0C4
4A7618D0743848 0A7543586A680C60A5
A26FD398D2A34011A5086E68D3B1F89C
4F7CA02F7FF",7670
1240 DATA "208D30C602F7FF204A4A8
11224E83501B6FF2384F7B7FF235F39B
6FF238A08B7FF23B6FF0184F7B7FF01B
6FF0384F7B7FF0339C6B45A26FD398DD
F860A1F895A",8294
```



Disk Drive Speed Tester
by Steve Bjork
Copyright 1985 by SRB Software

Disk Drive Selector

Please select disk drive

Command Menu

Drive Speed History
Adjust Drive Speed
Exit Program

```
1250 DATA "26FDF6FF20C8F0F7FF204
C814C25EE20BFC6088CC6027EAC46273
B8140263734 02B6FF2284E088E035022
62ABDB3E4344033 8DFB3C6F506C50E04
E820024F8EB",7796
1260 DATA "4EA6504AA14D24C9ED5B3
5409DA527068 12C26C09D9F6E9DFB200
075004D0041017401860199 01A43404F
6FF22C8E0C4E0DA6F350427046E9DFAF
93262347633",6783
1270 DATA "8DFAEEE65D308CD258EC8
5308BA6E4AD84E65CCAE08605DD8835F
6A14D2503A64D4AA75B6F5D39A14E250
3A64E4AA75C6C5D3901100111010E015
60116017201",6740
1280 DATA "7DFEFB015B01920073018
800E1005F810D2208483 08CDCEC866E8
B8020816022301700A5E65CE14E25066
F5C6C5B8D38318D0165C6083D31ABEC4
BE35B9BBA1F",6426
1290 DATA "01C608A6A0A85EA784308
8205A26F46C5C39E64EE05C5A2B0B340
4862017FFBB35042 0F26F5C6C5B3402E
65BE14D25576A5B8D55860FA740A64D4
A2731A64B9B",6532
1300 DATA "BAE64C1F01A64D4A48484
83412E64E542406A6890100A780E7502
70AEC890100ED816A5026F6351230882
04A26DDC608A65E3414E64EA7805A26F
B3514308820",6159
1310 DATA "5A26EF8602A7403582347
68602A74017FBFF35F68DF3860AA740E
C4B9BBA1F01A65EE64D585858 3414E64
EA7805A26FB3514308820 5A26EF6F5B6
F5C8602A740",7038
1320 DATA "396F5E398601A75D39860
3A75D39811F241CA74C408B20A74E6F5
B6F5C6C5D398117240AA74B408B18A74
D6C5D396F5D16FE1E27F9A14E22F5A74
E6C5D3927EE",6100
1330 DATA "A14D22EAA74D6F5D3986F
FA75E39EC5B5A2A08E64E5A4A2A024C5
FED5B862017FEB96A5C39A65C4A2A03A
64E4AA75C39A65C4CA14E25014FA75C3
96A5B2A05A6",6510
1340 DATA "4D4AA75B39E65CC40750C
B08862034061 7FE8835065A26F639000
000000000000008080808000800000A0
A0A00000000000A0A1F0A1F0A0A00081
E281C0A3C08",2783
1350 DATA "003232040810262600102
8281 02A241A00080810000000000 0040
81010100804000804020202040800082
A1C3E1C2A08000008083E08080000000
00000080810",898
1360 DATA "000000003E00000000000
0000000080800020204081020200 01C2
2262A32221C00081808080808 1C001C2
2020C10203E001C22020C02221C00040
C143E040404",956
1370 DATA "003E20203C02023C001C2
2203C22221C003E220404080808001C2
2221C22221C001C22221E02221C00000
80000080000000008080008081000040
81020100804",1190
1380 DATA "0000003E003E000000100
80402040810001C22020408000 8001C2
2021A2A2A1C001C22223E222222003C2
2223C22223C001C2220202 0221C00382
42222222438",1550
1390 DATA "003E20203C20203E003E2
0203C202020001C22202E22221C00222
2223E222222003E08080808083E000F0
2020202120C002224283028242200202
0202020203C",1833
1400 DATA "0022362A2A22222200223
2322A262622001C22222222221C003C2
2223C202020001C2222222A241A003C2
2223C282422001C22201C02221C003E0
80808080808",1898
1410 DATA "002222222222221C00222
22222141408002222222A2A362200222
214081422220022221408080808003E0
2040810203E0038202020202038 00202
01008040202",1548
1420 DATA "000E02020202020E00081
C3E08080808000008183E18080000000
000000000000000000C020E120D00202
03C2222223C0000001C2220221C00020
21E2222221E",961
1430 DATA "0000001C223E201C00040
A081C080808000000 1C22261A021C202
02C32222222000800180808081C00001
80808080828102020242830282400180
8080808081C",1226
1440 DATA "000000764949494900000
02C32222222000000 1C2222221C00000
02C32322C202000001A26261A0202000
02C322020200000001C201C021C00080
81C08080A04",1530
1450 DATA "000000222222261A00000
02222221408000000 4141494936 00000
02214081422000000 22221E02021C000
03E0408103E00040810081008040 0080
80800080808",1136
1460 DATA "00080402040204080 0000
02050 0A040000FFFFFFFFFFFFFFFF4D4
F5553452056455253494F4E20322E302
0434F505952494748542031393836204
2592053524 2",4776
1470 DATA "20534F465457415245204
14C4C2052494748545320524553455 25
64544205055424C494320444F4D41494
E2042592053544556452 0424A4F524B2
00000000000",4038
2000 PMODE 0,1:PCLEAR 1:GOTO100
```

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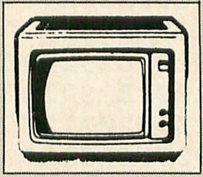

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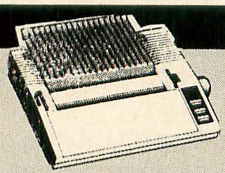

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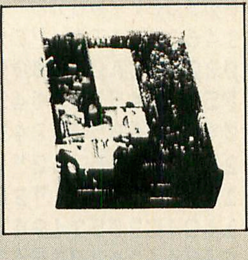

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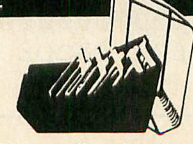

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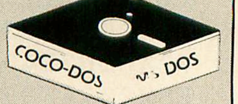

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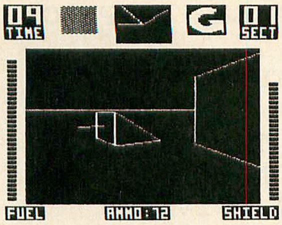

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190 243
350 5
END 0

Listing 2: LINES

```
10 'LINES/BAS
20 'THIS IS A DEMO PROGRAM FOR
30 'THE MOUSE (2.0) PROGRAM FROM
40 'SRB SOFTWARE
50 'WRITEN BY STEVE BJORK
60 'YOU MUST HAVE MOUSE/BIN
70 'TO RUN THIS PROGRAM
100 CLEAR 200,&H33FF:MO=&H3400
110 ' ADD A ' TO THE START OF TH
E NEXT LINE IF ON A CASSETTE SYS
TEM
120 IF PEEK(MOUSE)<>22 THEN LOAD
M "MOUSE",MOUSE
130 'REMOVE THE ' FROM THE NEXT
LINE IF ON A CASSETTE SYSTEM
140 'IF PEEK(MOUSE)<>22 THEN CLS
:PRINT"LOADING MOUSE (2.0) BINAR
Y FILE":CLOAD"MOUSE"
150 DEF USR0=MOUSE
160 PMODE 4,1:PCLS0:SCREEN 1,1
170 FOR Y=0 TO 2:WINDOW$(Y)=CHR$
(4):FOR X=1 TO 4
180 READ A:WINDOW$(Y)=WINDOW$(Y)
+CHR$(A):NEXT X,Y
190 U=USR(0):PRINT CHR$(3);WINDO
W$(1);CHR$(12);" Exit    Clear";
WINDOW$(2);
200 PRINT WINDOW$(2);CHR$(2);CHR
$(12);"  ^         ^"
210 PRINT"  ^        ^";STRING$(
3,95);"Clears screen"
220 PRINT"  ^":PRINT"  ^";STRING
$(12,95);"Exits program";CHR$(13
)
230 PRINTTAB(13);"Lines":PRINTTA
B(9);"by Steve Bjork":PRINT
240 PRINT"Use the cursor to sele
ct the    start and end points o
f a line.":PRINT
250 PRINT"The top line has two o
ptions,   Exit-exit program,
          Clear- Clear the scree
n."
260 PRINT:PRINT"Press the button
 to continue."
270 IF USR(4)=0 THEN 270
280 GOSUB 500
290 U=USR(1)'TURN ON CURSOR
300 GOSUB 410:IF M=1 THEN 300
310 U=USR(0)'TURN OFF CURSOR
320 Y1=Y:X1=X
```

```
330 PSET (X*2,Y,1)
340 U=USR(1)'CURSOR ON
350 U=USR(8)
360 GOSUB 410:IF M=1 THEN 290
370 U=USR(0)'cursor off
380 LINE (X1*2,Y1)-(X*2,Y),PSET
390 U=USR(1):U=USR(7)
400 GOTO 290
410 TY=USR(3):TX=USR(2)
420 IF USR(4)=0 THEN 410
430 Y=USR(3):X=USR(2)
440 IF Y<>TY OR X<>TX THEN 410
450 IF Y>=9 THEN M=0:RETURN
460 IF X<24 THEN 510
470 IF X<32 THEN 410
480 IF X>56 THEN 410
490 M=1:U=USR(7):GOSUB500:U=USR(
1):RETURN
500 PRINT WINDOW$(2);CHR$(2);CHR
$(12);WINDOW$(0);:RETURN
510 'remove cursor and system
520 U=USR(0):U=USR(7):U=USR(6)
530 STOP
540 DATA 0,0,32,24
550 DATA 0,0,32,1
560 DATA 0,1,32,23
```

28	141
220	28
400	220
630	91
820	244
2100	126
END	103

Listing 3: DISKTIME

```
0 ' DISKTIME/BAS
1 'PROGRAMED BY STEVE BJORK
2 'COPYRIGHT 1986 BY
3 'SRB SOFTWARE, U.S.A.
4 'MOUSE/BIN (VERSION 2.0) IS
5 'USED BY THIS PROGRAM.
6 'A 64/32K COLOR COMPUTER WITH
7 'A JOYSTICK OR MOUSE IS NEEDED
8 'FOR TESTING THE SPEED OF A
9 'DISK DRIVE.
10 'BEFORE A SPEED TEST CAN BE
11 'USED ON A DRIVE IT MUST BE
12 'SELECTED FIRST. JUST MOVE
13 'THE ARROW ON THE SCREEN OVER
14 'THE DISK TO BE TESTED AND
15 'PRESS THE BUTTON.
16 'A NEW DRIVE MAY BE SELECTED
17 'AT ANY TIME FROM THE MAIN
18 'MENU.
19 'THE AT THE BOTTOM OF THE
20 'SCREEN ARE 3 COMMANDS,
21 'DRIVE SPEED HISTORY,ADJUST
22 'DRIVE SPEED AND EXIT PROGRAM
23 'HISTORY GIVES A BAR GRAPH OF
24 'MOTOR SPEED.
25 'ADJUST IS FOR TUNING THE
26 'DRIVE SPEED.
27 'EXIT IS TO END THE PROGRAM
28 'PRESS THE BUTTON OR REMOVING
29 'THE DISK FROM A DRIVE IN
30 'TEST WILL EXIT THE TEST.
31 '
32 'THIS PROGRAM HAS BEEN PLACED
33 'PUBLIC DOMAIN BY STEVE BJORK
34 'AND SRB SOFTWARE FOR PRIVATE
35 'USE ONLY! THIS SOFTWARE MAY
36 'NOT BE USE (IN PART OR IN
37 'WHOLE) AS PART OF ANY
38 'MARKETED PRODUCT.
39 '
100 PCLEAR4:PMODE 4,1:PCLS1
110 CLEAR 50,&H737F:MOUSE=&H7380
:DIM D(3),P(60),C(23,17),MENU$(3
),A(7,7)
120 IF PEEK(MOUSE)<>22 THEN LOAD
M"MOUSE",MOUSE
130 DEF USR0=MOUSE:DEF USR1=&H7F
80
150 FOR X=&H7F80 TO &H7FFF:READ
U:POKE X,U:NEXT X
160 DEF FND(U)=INT((300-((U-2237
0)/74.56))*10+.5)/10
170 U=USR0(0)'LINK IN MOUSE
180 D(0)=41:D(1)=42:D(2)=44:D(3)
=104
190 SC=PEEK(&HBA)*256:SD=-1
200 FOR Y=SC TO SC+544 STEP 32
210 FOR X=Y TO Y+2:READ D
220 POKE X,D:NEXT X,Y
230 GET (0,0)-(23,17),C,G
250 FOR X=0 TO 2:READ MENU$(X):N
EXT
260 PCLS1:FOR Y=SC TO SC+224 STE
P 32
270 READ D:POKE Y,D:NEXT
280 GET (0,0)-(7,7),A,G
290 FOR Y=0 TO 1:WINDOW$(Y)=CHR$
(4):FOR X=1 TO 4:READ U:WINDOW$(
Y)=WINDOW$(Y)+CHR$(U):NEXT X,Y
300 PCLS1:SCREEN 1,1:PRINT WINDO
W$(0);CHR$(3);CHR$(12);:PRINT@19
9,"Disk Drive Selector";:FORD=0T
O3
310 GOSUB 2000:NEXT:LINE (0,46)-
(255,100),PRESET,B:LINE(0,57)-(2
55,57),PRESET
320 PRINT@36,"Disk Drive Speed T
ester":PRINT@73,"by Steve Bjork"
330 PRINT@97,"Copyright 1985 by
```

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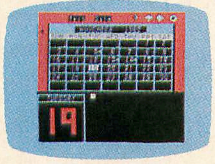
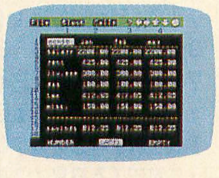
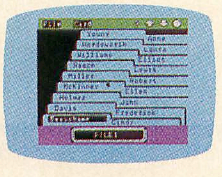
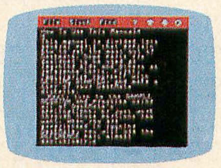

CALENDAR


LEDGER

TELECOM


INDEX CARDS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1
2
3
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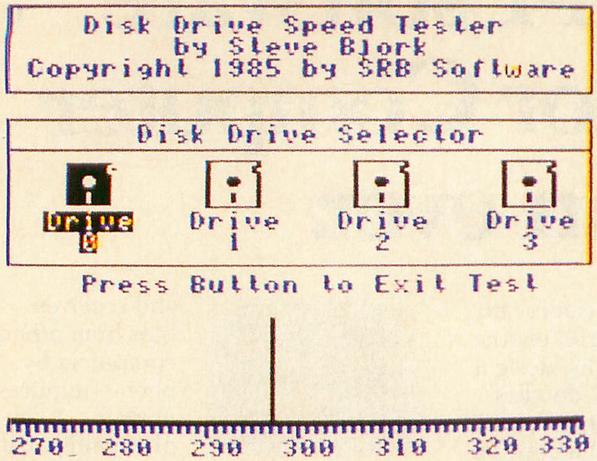
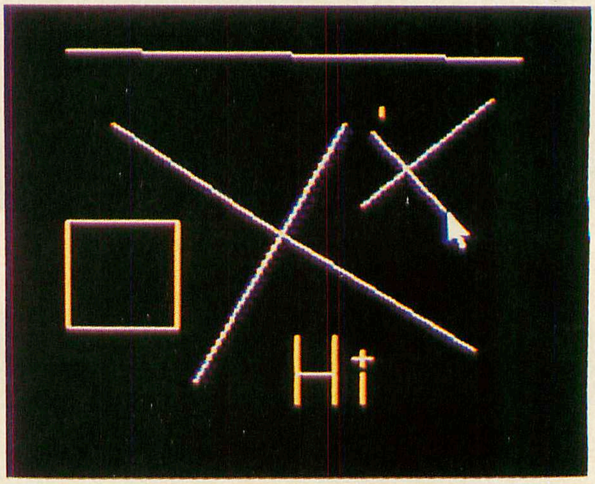

Disk Drive Speed Tester
by Steve Bjork
Copyright 1985 by SRB Software

Disk Drive Selector

Press Button to Exit Test

```
SRB Software";
340 LINE(0,4)-(255,36),PRESET,B
350 U=USR(0):GOSUB2100:PRINT@522
,"Command Menu"
360 FORX=0TO2:PRINT CHR$(3);:GOS
UB2050:NEXTX
370 LINE(0,123)-(255,171),PRESET
,B:LINE(0,138)-(255,138),PRESET
380 IF SD=-1 THEN PRINT@420,"Ple
ase select disk drive"
400 U=USR(4):U=USR(1):U=USR(7)
410 IF USR(4)=0 THEN 410
420 Y=USR(3):X=USR(2)
430 IF Y<61 THEN 410
440 IF Y>78 THEN 600
450 A=X AND 31:IF A<12 OR A>23 T
HEN 410
460 A=INT(X/32):IF A=SD THEN 410
470 U=USR(0)+USR(8)
480 IF SD<>-1 THEN D=SD:SD=A:GOS
UB 2000
490 SD=A:D=SD:GOSUB 2000
500 GOSUB 3000:GOSUB 2100:PRINT@
551,"Testing for Drive ";CHR$(SD
+48);
510 FOR X=1 TO 300:NEXT
520 U=USR1(0):GOSUB3010:IF U>0 T
HEN 350
530 GOSUB 2100:PRINT@518,"Disk D
rive not on line";:PRINT@548,"or
 a disk is not in drive";
540 PRINT@612,"PRESS BUTTON TO C
ONTINUE";:U=USR(4)+USR(7)
550 IF USR(4)=0 THEN 550
560 D=SD:SD=-1:GOSUB 2000
570 GOTO 350
600 IF Y<144 OR Y>167 THEN 410
610 Y=INT((Y-144)/8)
620 A=LEN(MENU$(Y))*2
630 IF X<64-A OR X>64+A THEN410
640 IF SD=-1 AND Y<2 THEN 410
650 U=USR(0):X=Y:PRINT CHR$(2);:
GOSUB2050
660 U=USR(7):IF X=2 THEN 999
670 GOSUB 3000:FORX=1 TO 300:NEX
T
680 IF USR1(0)=0 THEN GOSUB 3010
:GOTO 530
690 IF Y=0 THEN 800
700 GOSUB 1000:A=-1:U=USR(4)
710 U=USR1(0):IF U=0 THEN GOSUB
3010:GOTO 350
720 IF USR(4)<>0 THEN GOSUB 3010
:U=USR(8):GOTO 350 ELSEP=FND(U):
PRINT@520,USING" ###.#  ##.#!";P
;INT(ABS(300-P)*3.33)/10;"%";
730 IF P<272 THEN P=270 ELSE IF
P>327 THEN P=327
740 P=INT((P-270)*4.2666):IF P=A
 THEN 710
750 IF A>-1 THEN LINE(A-2,152)-(
A+5,159),PSET,BF
760 A=P:PUT(A-2,152)-(A+5,159),A
,PSET:GOTO 710
800 GOSUB 1000:FOR X=0 TO 60:P(X
)=0:NEXT:U=USR(4)
810 U=USR1(0):IF U=0 THEN GOSUB
3010:GOTO 350
820 IF USR(4)<>0 THEN GOSUB 3010
:U=USR(8):GOTO 350
830 P=INT(FND(U)-270):IF P<0 THE
N P=0 ELSE IF P>60 THEN P=60
840 IF P(P)>=40 THEN 810
850 P(P)=P(P)+1
860 LINE(P*4+8,160-P(P))-(P*4+9,
160-P(P)),PRESET
870 GOTO 810
999 U=USR0(6):END
```



```
1000 GOSUB 2100:LINE(0,160)-(252
,162),PRESET,BF:FOR X=8 TO 248 S
TEP 40:LINE(X,162)-(X,168),PRESE
T:NEXT:FOR X=0 TO 252 STEP 4:LIN
E(X,162)-(X,165),PRESET:NEXT
1010 PRINT@672,CHR$(3);"270  280
  290  300  310  320 330";CHR$(1
);CHR$(4);CHR$(13);"Press Button
 to Exit Test";:RETURN
2000 IF SD=D THEN PRINT CHR$(2);
:PUT(24+D*64,61)-(47+D*64,78),C,
PRESET ELSE PRINT CHR$(3);:PUT(2
4+D*64,61)-(47+D*64,78),C,PSET
2010 PRINT@322+D*8,"Drive";CHR$(
1);CHR$(D*8+4);CHR$(11);CHR$(48+
D);:RETURN
2050 PRINT CHR$(1);CHR$(16-LEN(M
ENU$(X))/2);CHR$(18+X);MENU$(X);
:RETURN
2100 PRINTWINDOW$(1);CHR$(3);CHR
$(12);WINDOW$(0);:RETURN
3000 POKE &HFF40,D(D):RETURN
3010 POKE &HFF40,0:RETURN
9000 DATA 77,39,17,57,255,255,25
5,255,0,166,140,252,39,5,174,140
,245,175,106,59,52,113,26,80,254
,1,10,239,140,230,51,140
9010 DATA 232,255,1,10,48,140,55
,175,140,220,111,140,219,142,0,0
,182,255,72,16,142,127,255,206,2
55,72,198,224,99,140,201,247
9020 DATA 255,72,30,136,30,136,1
98,2,229,196,38,9,49,63,38,248,1
11,140,181,32,18,48,1,38,252,111
,140,172,32,9,182,255
9030 DATA 72,132,124,31,16,32,14
,134,208,183,255,72,30,136,30,13
6,182,255,72,79,95,174,140,140,1
91,1,10,53,113,126,180,244
10000 DATA 0,0,0,63,255,252,63,2
55,240,63,255,243,63,255,240,63,
255,252,63,195,252,63,129,252,63
,129,252,63,195,252,63,255,252,6
3,255,252,63,231,252,63,231,252,
63,231,252,63,231,252,63,255,252
,0,0,0
10010 DATA "Drive Speed History"
,"Adjust Drive Speed","Exit Prog
ram"
10020 DATA 239,239,239,239,1,131
,199,239
10100 DATA 0,0,32,24, 0,14,32,10
```

The Crossword Creator Contest

Can you create a totally symmetrical crossword puzzle using the *Word+* program and the specifications outlined in the accompanying article on Page 38 of the May 1986 issue of THE RAINBOW? If so, you may wish to enter The Crossword Creator Contest. And, if we choose to print your crossword puzzle, you will be awarded a special prize.

Send us a disk or cassette copy of the data file of your puzzle created by *Word+* along with a printed copy of the crossword puzzle — including the clues and answers. Be sure to put a title on the puzzle and if possible, follow a general interest theme.

Entries will be judged on the following criteria:

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Number of words
Spelling
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Thematic originality
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Enter as often as you like! Please note: We consider your act of entering the contest as consent to publish your creation.

The Crossword Creator Contest is open to all RAINBOW readers, advertisers and employees of Falsoft, Inc.

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16K
ECB

Developing Logical Reasoning Skills

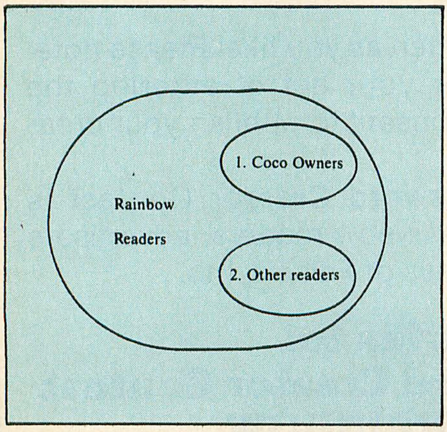
By Steve Blyn
Rainbow Contributing Editor

This month's article concerns development of reasoning powers. Our program presents an exercise in logical thinking. A statement and a conclusion are presented and the user's task is to decide whether the conclusion is true or false based only on the original statement.

For example:

Statement: All CoCo owners buy THE RAINBOW magazine.
Conclusion 1: All RAINBOW readers own a CoCo.
Conclusion 2: Some CoCo owners buy THE RAINBOW magazine.

Here is a picture to help visualize this:



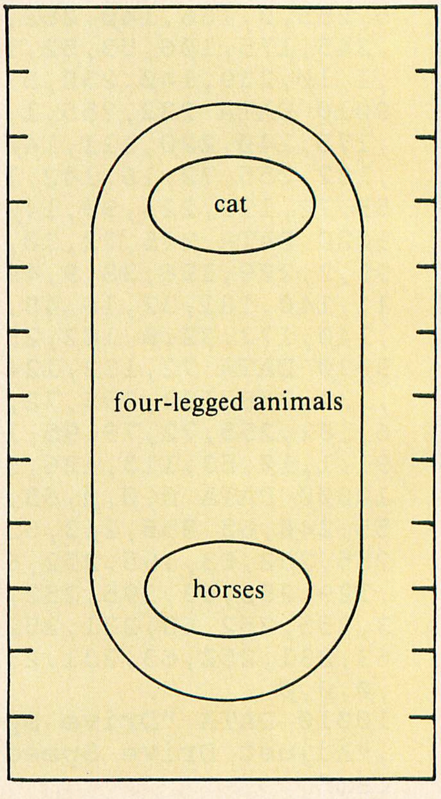
Conclusion 1 is false because owners of other computers or people who do not even own a computer may also buy THE RAINBOW. Conclusion 2 is true. The word some can mean any amount from one to all. Or looked at another way, certainly some CoCo owners buy THE RAINBOW if we are told that all of them buy it.

This kind of reasoning is necessary to develop abilities in abstract math skills as well as computer programming skills. Modern math courses on all levels stress logical thinking skills. This is good because many times students understand the arithmetic of a math task but don't really understand how or when to apply it. Activities that encourage logical thinking in math are as important as those that teach skills.

To varying degrees, our example of logical thinking is also stressed in many math courses. The ultimate degree is the syllogism. A syllogism is a pair of premises or statements with one conclusion. Syllogisms are really the next step up in our program. An example of a syllogism is :

Statement 1: All horses have four legs
Statement 2: My cat has four legs
Conclusion: My cat is a horse

This conclusion does not follow because my cat can be one of many other four-legged creatures besides horses. Boolean algebra and truth tables are ways to approach this type of example. But for our purposes, we will draw a picture of the two statements. This helps many students visualize the problem better. The illustration is called a Venn diagram and is merely a picture of our example syllogism to show whether the conclusion is true or not.



Computer programming also stresses skills in logic. For example, here is a simple program that illustrates poor logic.

Steve Blyn teaches both exceptional and gifted children, holds two master's degrees and has won awards for the design of programs to aid the handicapped. He owns Computer Island and lives in Staten Island, New York.

```
10 A = 10 : B = 0

20 FOR T = 1 TO 100

30 IF C> 10 THEN PRINT"HELLO"

40 A = A + 1

50 B = B + 2

60 C = A - B

70 NEXT T
```

The value of the variable 'C' never reaches 10 and the program therefore, never prints the "hello" message. Try this short program for yourself. Fixing it is a simple challenge and good practice for a beginner.

Our program presents one premise or statement and one conclusion to be judged true or false by the user. The `DATA` lines actually contain three conclusions for each statement. One is randomly chosen. After 10 turns, a score is given and the program may be run again or ended.

Line 30 sets the dimensions of the data to be entered and read. "A$" and 'N' represent the five possible statements. "B$" represents the three possible conclusions for each statement and "C$" represents the correct answers.

Lines 50 through 60 read the `DATA` lines. The variable 'K' in Line 80 is the program counter. There are 10 questions to a round. When the counter reaches 11, Line 100 sends the program to the score card and end routines on lines 300 through 350. Lines 140 through 200 randomly choose and print a statement and its accompanying conclusion. Lines 210 through 260 ask for the answer and tell the user whether or not he is correct.

Exercises similar to ours are also often stressed in language arts classes. These exercises help develop critical reading skills. They are a popular way to combine development of careful reading for details or drawing conclusions skills with a little fun.

Please feel free to alter or add to the `DATA` lines for your purposes. Remember to adjust the `DIM` statements and the value of 'N' on Line 30 if they are changed. Encourage the children to draw illustrations to help them think out problems that give them trouble. As always, we at Computer Island are glad to hear about your experiences with these programs. ☐

The listing: `TRUEFALS`

```
10 REM TRUE & FALSE REASONING
20 REM STEVE BLYN,COMPUTER ISLAN
D,NY,1986
30 DIM A$(5),B$(15),C$(15):N=5
40 P$=STRING$(32,179):R$=STRING$
(32,188)
50 FOR T= 1 TO N:READ A$(T):NEXT
 T
60 FOR T=1 TO N*3:READ B$(T),C$(
T):NEXT T
70 CLS5:K=K+1
80 IF K=11 THEN 300
90 PRINT@12,"LOGIC";
100 PRINT@0,"#=";K;
110 PRINT@28,"R=";CR;
120 PRINT@32,P$;:PRINT@128,R$;
130 PRINT@64," READ THE STATEMEN
T. DECIDE IF  THE CONCLUSION IS
TRUE OR FALSE.";
140 R=RND(N)
150 PRINT@192,"statement";
160 PRINT@224,A$(R)
170 L=RND(3)
180 H=(R-1)*3+L:R=H
190 PRINT@288,"conclusion";
200 PRINT@320,B$(R)
210 PRINT@384,"answer here: ";:
220 EN$=INKEY$
230 IF EN$="T" OR EN$="F" THEN
240 ELSE 220
240 PRINTEN$
250 IF EN$=C$(R) THEN PRINT@400,
"CORRECT":CR=CR+1:PLAY"O4L55CEGG
ECEGGEC"
260 IF EN$<>C$(R) THEN PRINT@400
,"SORRY":PLAY"O3L20GG"
270 PRINT@486,"PRESS ENTER TO GO
 ON";
280 N$=INKEY$
290 IF N$=CHR$(13) THEN 70 ELSE
```

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```
280
300 CLS:PRINT"YOUR GRADE THIS TI
ME WAS"CR*10;"%"
310 PRINT:PRINT"PRESS ENTER TO G
O ON OR E TO END";
320 R$=INKEY$
330 IF R$=CHR$(13) THEN RUN
340 IF R$="E" THEN CLS:END
350 GOTO 320
360 REM HERE ARE THE STATEMENTS
370 DATA NOT ALL VIOLIN PLAYERS
ARE BOYS
380 DATA ALL STUDENTS MAKE GOOD
GRADES
390 DATA NOT ALL DOGS ARE BLACK
400 DATA ALL TELEVISION SETS ARE
 COLOR
410 DATA MANY PEOPLE PLAY BASEBA
LL
420 REM HERE ARE THREE QUESTIONS
 FOR EACH STATEMENT
430 DATA SOME VIOLIN PLAYERS ARE
 GIRLS,T
440 DATA VIOLIN PLAYERS CAN BE B
OYS,T
450 DATA ALL VIOLIN PLAYERS ARE
GIRLS,F
460 DATA SOME DON'T MAKE GOOD GR
ADES,F
470 DATA NO STUDENTS MAKE GOOD G
RADES,F
480 DATA MOST STUDENTS MAKE GOOD
 GRADES,T
490 DATA ALL DOGS ARE NOT BLACK,
T
500 DATA ONLY SOME DOGS ARE BLAC
K,T
510 DATA NO DOGS ARE BLACK,F
520 DATA NOT MANY TV SETS ARE CO
LOR,F
530 DATA NO TV SET IS COLOR,F
540 DATA EVERY TV SET IS COLOR,T
550 DATA SOME PEOPLE PLAY BASEBA
LL,T
560 DATA SOME PEOPLE DON'T PLAY
BASEBALL,T
570 DATA NO ONE PLAYS BASEBALL,F
```

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Special Education and The Computer

By Michael Plog, Ph.D.
Rainbow Contributing Editor

Almost every school district in this country includes handicapped students. Special education programs provide services for handicapped students with a variety of conditions. They can be severe physical handicaps, perceptual learning disabilities, speech or language impairments, or a host of other types of conditions that limit a student's ability to succeed in a regular classroom.

Technological advances have presented both promise and problems for special education students. While technology has provided many opportunities for handicapped people, problems have been created that add further limits and constraints to handicapped people. For example, consider the telephone. Alexander Graham Bell invented the telephone while working with deaf education. The original intention of the telephone was as a hearing aid. After moving into the area of mass communication, the telephone has actually become a limitation to deaf people. Most of us consider the telephone as a means of communication. Almost every household in this country has a telephone and it is impossible to think of a business without one. Yet, to the deaf, the telephone is an instrument of restriction. Special equipment is needed for the deaf to use a normal telephone. How ironic.

The technology of microcomputers also provides promise and problems for the handicapped. I do not think anyone doubts that computers have provided much more benefit for handicapped people than harm. Computer applications have allowed a wide range of opportunities for the handicapped that were impossible to believe just a few decades ago. Implanted electronic controllers operate artificial limbs, allowing mobility for paralyzed people. Computers "read" written text, then translate it into sensory impressions for the blind allowing access to documents that are not in braille.

Yet, there are restrictions for the handicapped using computers. An orthopedic handicap can cause trouble for people using a computer keyboard — from a mild annoyance to an impossibility. Adaptive equipment can be obtained or created, but the trouble is still there. Fairly expensive special equipment is required for blind people to use microcomputers. Generally, the greater the visual impairment, the greater the cost of the adaptive equipment.

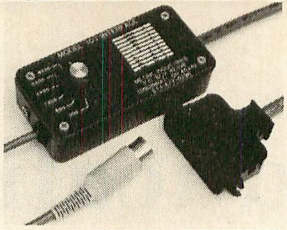
A discussion about computers and the handicapped involves two separate components. First is the application of computers to problems associated with the different handicaps. In general, computers are used to improve options for handicapped people. Second, however, the way computers are built, access for the handicap is generally limited.

Most of the examples of dealing with computer applications for the handicapped are in situations other than schools. But there is use of computers for the handicapped in the school arena. At the end of 1983, about 60,000 computers were used for the handicapped in schools. By the end of 1985, over 200,000 computers were in use. Much of this use is in record keeping. Teachers and administrators keep track of students and services provided in order to report to funding sources, especially the federal government. Federal reporting can be a complex process and is greatly assisted by microcomputers.

Michael Plog received his doctorate degree from the University of Illinois. He has taught social studies in high school, worked in a central office of a school district and currently is employed at the Illinois State Board of Education.

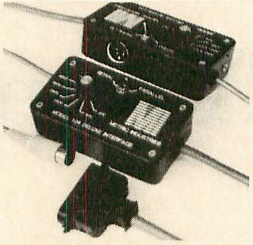
Metric Industries

Model 101 Interface $39.95



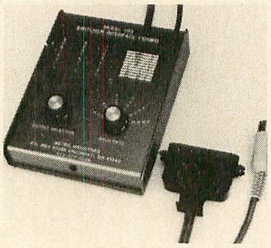
The Model 101 is a serial to parallel interface intended for use with a COCO and any Centronics compatible parallel input printer. The 101 has 6 switch selectable baud rates (300-9600). The 101 is only 4" × 2" × 1" and comes with all cables and connectors for your computer and printer.

The Model 104 Deluxe Interface $51.95



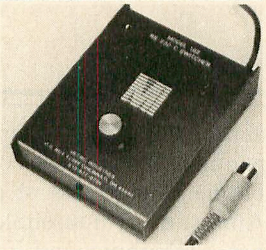
The Model 104 is a serial to parallel interface like the Model 101 but it has the added feature of a serial port (sometimes referred to as a modem switch). This feature allows the connection of a parallel printer and any serial device (modem, serial printer etc.) to your computer. You may then select either output, serial or parallel, with the flip of a switch. The 104 is only 4.5" × 2.5" × 1.25" and comes with all cables and connectors for your computer. You supply the serial cable for your modem or other serial device.

Model 103 Combo $68.95



With the turn of a knob the model 103 switches your computer's RS232C serial port to any one of 3 outputs — 2 serial and 1 parallel. The serial ports may be used for modems, serial printers or even another computer. The parallel port can be used with any Centronics compatible printer. The 103 has the best features from the 101 and 102: color coded position indicator lights, 6 switch selectable baud rates, heavy anodized aluminum cabinet, and many more.

Model 102 Switcher $35.95



The Model 102 has 3 switch positions that allow you to switch your computer's serial output between 3 different devices (modem, printers or another computer). The 102 has color coded lights that indicate the switch position. These lights also act as power indicators to let you know your computer is on. Supplied with the 102 are color coded labels that can be applied to your accessories. The 102 has a heavy guage anodized aluminum cabinet with non-slip rubber feet.

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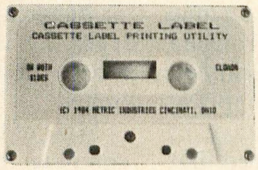

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But when the computer is used for record keeping tasks, teachers, administrators and clerks operate the computer. Special education students should have the same opportunity to develop computer literacy as other students. Indeed, for many handicapped students, some of the best employment opportunities lie in the area of data processing.

In order to make computers fully accessible to the handicapped, different types of modifications are required. In some cases, hardware needs to be modified. For the blind, a television screen is useless. A device that translates television symbols to a special braille pad allows computer access for blind persons. One-handed typists generally have a problem when two keys must be held down together, such as a control key and another key. A simple modification is required in this case.

> ***"The computer is a motivating device."***

Software modifications are also important for special education students. For example, a student with a learning disability needs software that provides structure and organization to help with perceptual difficulties. Motivational comments used by many programmers are inappropriate for the emotionally handicapped learner. A student with a severe emotional handicap can be very adept at picking up negative body language from the teacher. While the computer itself may be "value free," instructional programs are often not. Thus, some software is not useful for certain special education students.

The computer can and should be utilized by these students. The computer is a motivating device for students, handicapped and non-handicapped alike. It allows the student to determine the pace of the lesson, which is a crucial component of education for the handicapped. Schools should give special education students access to computers. It may well be that computers will give a student access to his future. ⌓

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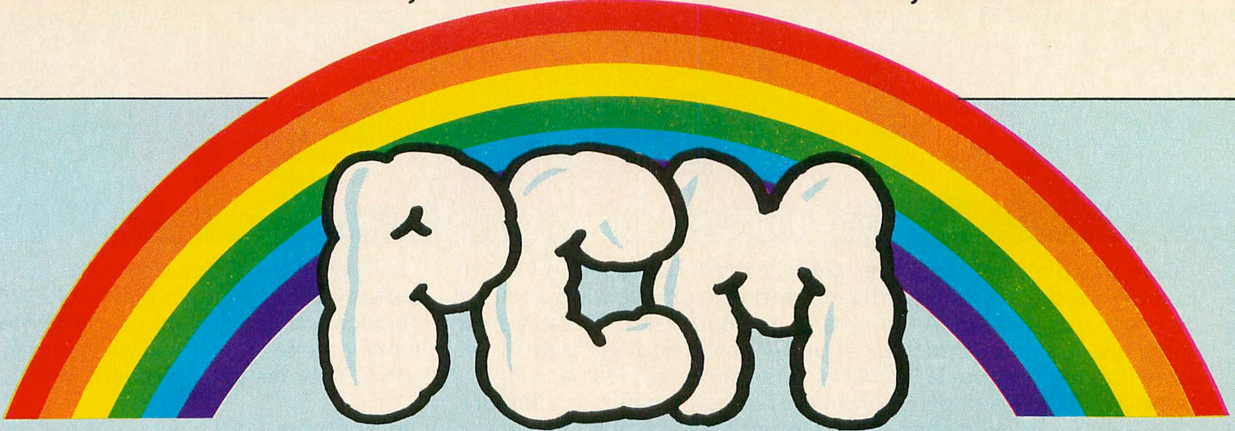

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3,056	Matthew Nelson, Endwell, NY
1,954	Steven Bullard, Allen, OK
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6,665	David Salvatore, New Kensington, PA
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58,200	★Scott Bellman, Bettendorf, IA
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54,300	Daphnie Phillips, Evansville, WI
27,950	Mike Tindall, Manitowoc, WI
ASTRO BLAST *(Mark Data)*	
101,989	★David Salvatore, New Kensington, PA
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53,950	Bill Fritsch, Whitehall, PA
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3,050	Jay Lose, Gulfport, MS
3,000	Michael Scott, Johnstown, NY
2,500	Steven Bullard, Allen, OK
BEAM RIDER *(Spectral Associates)*	
4,969,060	★James Oakley, Nashville, TN
3,042,470	Evelyn Thompson, Nederland, TX
747,200	Robert Eering, Swift Current, Saskatchewan
310,420	Trevor Nagel, Swift Current, Saskatchewan
BLACKBEARD'S ISLAND *(NOVASOFT)*	
65	★Jeff Hillison, Blacksburg, VA
78	Roy D. Grant, Toledo, OH
79	Jeff Roberg, Winfield, KS
BLACK SANCTUM *(Mark Data)*	
106	★Jeff Hillison, Blacksburg, VA
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451,650	★Martha St.John, Highland Falls, NY
279,600	Alan Drazen, Longwood, FL
216,350	Jean-Francois Morin, Loretteville, Quebec
166,175	Scott Purrone, Roselle Park, NJ
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BROTAN THE BLUE (THE RAINBOW, 8/85)	
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BUBBLE WARS (THE RAINBOW 2/86)	
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BUSTOUT *(Radio Shack)*	
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21,850	Charles Egglesfield, Sault Ste Marie, Ontario
21,236	Mike McCafferty, Idaho Falls, ID
18,403	Chris Zepka, North Adams, MA
14,500	Wayne Dewitt, Blue Island, IL
12,340	Mark Motel, Blue Island, IL
BUZZARD BAIT *(Tom Mix)*	
4,455,150	★Paul Rumrill, Gales Ferry, CT
3,091,700	Blossom Mayor, East Greenbush, NY
1,133,850	Rupert Young, Sheffield, MA
980,500	Fruber Malcom, Culpeper, VA
847,400	Gordon Rock, Davenport, IA
67,350	Jared Jolley, Elyria, OH
CANDY CO. *(Intracolor)*	
103,306	★Kirk Nedrebeg, Liverpool, OH
CANYON CLIMBER *(Radio Shack)*	
9,988,000	★Brannon Baxley, Live Oak, FL
9,129,100	Gary Mohnsen, Tucson, AZ
1,428,600	Chad McClellan, Rushville, IN
1,347,800	Lucy Dorego, Leamington, Ontario
1,004,000	Brett Fancher, Hooksett, NH
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85,200	Tricia Preder, Sheboygan, WI
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45,000	Chris Redmond, Waterville, ME
32,800	Kevin Radwan, Blue Island, IL
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30,050	Keith Miller, Houston, TX
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24,920	Edwin Prather, Oxnard, CA
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45,460	Joyce Walcott, Mt. Clemens, MI
40,610	Stephanie Kosara, Monroe, NY
COLOR BASEBALL *(Radio Shack)*	
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549-0	●Skipper Taday, East Lyme, CT
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COLOR BLACKJACK (THE RAINBOW, 10/83)	
$15,670	★Wayne Dewitt, Blue Island, IL
7,340	Helen Dewitt, Blue Island, IL
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107,864	★David Entenmann, Monroe, NY
COLOROUT *(Colorful Software)*	
34,085	★Tim Rueb, Stevensville, MI
COLORPEDE *(Intracolor)*	
3,107,194	★John Ray, Goodlettsville, TN
1,066,000	Keith Queen, Marietta, GA
1,006,000	Gail Queen, Marietta, GA
133,036	Mariano Frausto, Blue Island, IL
59,529	Kevin Radwan, Blue Island, IL
40,238	Ken Dewitt, Blue Island, IL
19,290	Hugo Frausto, Blue Island, IL
COLOR POKER (THE RAINBOW, 4/83)	
3,241,600	★Earl La Jesse Foster, Lynchburg, VA
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850,156	★Michael Brennan, Calgary, Alberta
800,060	Dan Mitenko, Calgary, Alberta
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545,000	Jay Roberg, Winfield, KS
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40,674	★David Entenmann, Monroe, NY
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365,400	★Bob Dewitt, Blue Island, IL
DEMOLITION DERBY *(Radio Shack)*	
104,900	★Michael Davidson, Cartersville, GA
100,900	Scott Lewis, Glide, OR
97,600	Hillel Morris, Chicago, IL
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DEMON ATTACK *(Imagic)*	
64,195	★Jon Ruhnow, Duncanville, TX
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68,872	★Janine Freamon, Citrus Heights, CA
65,215	Skip Freamon, Citrus Heights, CA
51,519	Michael Lizardy, Oregon, OH
37,912	Kenneth Merkel, Houston, TX
37,550	Keith Miller, Houston, TX
DONPAN *(Radio Shack)*	
20,000	★Rodrigo Maldonado, Whittier, CA
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2,070,460	★Robert Helfers, Sparta, IL
30,330	Ken Dewitt, Blue Island, IL
DOUBLE BACK *(Radio Shack)*	
2,586,300	★Eugene Roosa, Stone Ridge, NY
1,618,400	Diane Guernon, Montreal, Quebec
450,600	Michael Brennan, Calgary, Alberta
13,810	Christine Vollmer, Richmond Hill, NY
11,300	Owen Edson, Sherman Oaks, CA
DOWNLAND *(Radio Shack)*	
68,142	★Cooper Valentin, Vavenby, British Columbia
45,291	Chuck Morey, Bakersfield, CA
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37,990	John Siler, Dayton, OH
33,450	Mike Tindall, Manitowoc, WI
DRAGON FIRE *(Radio Shack)*	
123,120	★Rupert Young, Sheffield, MA
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21,221	Jermaine Jackson, Tallulah, LA
19,986	Owen Edson, Sherman Oaks, CA
17,051	Edwin Osorio, Honduras, Central America
8,229	Jason Nault, Salem, OR
4,161	Stephen Spak, Port St. Lucie, FL
DUNGEON QUEST *(Computerware)*	
16,985	★Albert Seliger, Lachine, Quebec
DUNKEY-MUNKEY *(Intellectronics)*	
276,900	★Jon Schmidt, Buffalo, MN
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198,000	Pat Leathrum, Newark, DE
66,900	Michael Drouin, Reeds Spring, MO
47,300	Esther Cassell, Eastern Passage, Nova Scotia
ELEC*TRON *(Tom Mix)*	
45,890	★Byron Alford, Raytown, MO
40,650	Brad Gaucher, Hinton, Alberta
28,760	Craig Cornell, Greentown, IN
32,625	John Morris, Rustburg, VA
ENCHANTER *(Infocom)*	
185/186	★David Tarleton, Williamsburg, VA
80/115	Scott Bellman, Bettendorf, IA
FALCON'S LAIR (THE RAINBOW, 8/85)	
18,461	★Joyce Smith, Butler, PA
17,463	Michael Scott, Johnstown, NY
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14,627	Alexander Taday, East Lyme, CT
12,497	Dick Teeter, Hawley, PA
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125,960	★John Gruz, Peabody, MA
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2,080	Brook Whiffen, Jackson, MS
1,600	Rick Busse, Granite City, IL
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24,360	★Curtis Taylor, Scarborough, Ontario

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22,940	Carlton Taylor, Scarborough, Ontario
11,250	Mariano Frausto, Blue Island, IL
7,270	Christopher Taylor, Scarborough, Ontario
5,200	Hiram Esparza, Blue Island, IL

GALACTIC ATTACK *(Radio Shack)*

54,300	★Cooper Valentin, Vavenby, British Columbia
33,930	Allisont Iarosis, Owego, NY
30,870	Oren Bergman, Herzlia, Israel
19,410	Ron Volans, Ogdensburg, NY

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1,306,640	★Jackie Maddox, Iron Station, NC
520,700	Keith Queen, Marietta, GA
352,000	Gail Queen, Marietta, GA
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253,960	James Ginn, Laurel, IN
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246,840	Ken Hurst, Richmond, CA
245,520	Randy Artiaga, Fort Worth, TX
153,050	Charles Shipman, Dexter, MO
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102,540	★Greg Erickson, Lowell, MA
76,900	Ghislain Chillis, Trois-Rivieres, Quebec
72,960	Sylvain Castonguay, Chicoutimi, Quebec
55,120	Jeff Weeks, Wetaskawin, Alberta
47,630	Alan Drazen, Longwood, FL
14,000	Kevin Radwan, Blue Island, IL

GOLD RUNNER *(NOVASOFT)*

855,250	★Jesse Sanders, Chimney Rock, CO
394,550	Marilyn dePierre, Mascouche Hts., Quebec
373,850	Carmen Izzi Jr., Waterbury, CT
350,450	Steven Arvay, St. Louis, MO
274,300	Andrew Reeves, Woodinville, WA

THE INTERPLANETARY FRUIT FLY (THE RAINBOW, 1/85)

37,000	★Scott Perkins, Port Orange, FL
26,500	Jon Jegglie, Bend, OR
22,000	Steven Bullard, Allen, OK
16,500	Michael Scott, Johnstown, NY

INVASION OF THE FLYING SAUCER PEOPLE (THE RAINBOW, 3/86)

920	★Michael Clerico, Seaford, NY

JUNIOR'S REVENGE *(Computerware)*

1,100,000	★Mike McCafferty, Idaho Falls, ID
1,090,000	Brett Bias, Enterprise, AL
1,072,600	Matthew Ramsay, Detroit, MI
969,590	Craig Cornell, Greentown, IN
376,000	Mike Wochek, Bethel, CT

KARATE *(Diecom Products)*

10,900	★Jim Doyle, Barrackville, WV
4,200	Scott Bellman, Bettendorf, IA

KEYS OF THE WIZARD *(Spectral Associates)*

662	★John Fulton, Boydton, VA

THE KING *(Tom Mix)*

4,092,600	★Fruber Malcom, Culpeper, VA
2,134,600	Tim Rueb, Stevensville, MI
1,670,900	Yolanda Farr, Sayre, PA
1,500,800	Kevin Cornell, Greentown, IN
79,340	Kevin Radwan, Blue Island, IL

KLENDATHU *(Radio Shack)*

1,347,020	★Paul Shoemaker, Quartz Hill, CA
1,177,550	Dan Franzen, Westlake, OH
412,809	Jay Pribble, Davenport, IA
266,362	Brian Ennis, Wilmington, NC
209,825	Gordon Alvarnaz, Taunton, MA

KNOCK OUT *(Diecom Products)*

168,383	★John Licata, Richton Park, IL
152,060	Rush Caley, Port Orchid, WA
149,190	Daniel Lesage, Laval, Quebec
137,900	John Rogers, Rye, NH
132,465	Kirk Nedrebeg, Liverpool, OH
130,485	Alex Seliger, Lachine, Quebec

LANCER *(Spectral Associates)*

209,200	★Gordon Alvarnaz, Taunton, MA

LEMANS *(Spectral Associates)*

0:57	★Robert Eering, Swift Current, Saskatchewan
0:64	Trevor Nagel, Swift Current, Saskatchewan
0:73	Chris Wright, Fredericton, New Brunswick

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220	★John Fulton, Boydton, VA

MARBLE MAZE *(Diecom Products)*

36,354,780	★Melvin Sharp Jr., Baltimore, MD
106,950	Dan Bouges, Niantic, CT
103,560	Stephane Ouzilleau, Lauzon, Quebec
34,330	Brian Biggs, Galloway, OH
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17,250	Keith Queen, Marietta, GA
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617,950	★Michael & David Garozzo, Morrisville, PA
161,920	John Guptill, Columbia, MO
17,900	Hiram Esparza, Blue Island, IL

MONKEY KONG *(Med Systems)*

622	★Krista Cassell, Eastern Passage, Nova Scotia
478	Glen Bilodeau, Otterburn Park, Quebec
365	Mark Ferris, Deep River, Ontario

MONSTER MAZE *(Radio Shack)*

206,780	★Wanda Jones, Brantford, Ontario
93,890	Rupert Young, Sheffield, MA
60,120	Steve Thomas, Ogdensburg, NY
43,610	Tim Cragg, Kahoka, MO
34,140	Cooper Valentin, Vavenby, British Columbia

MOON HOPPER *(Computerware)*

376,350	★Rene Ringuette, Riviere-du-Loup, Quebec
102,940	Krista Cassell, Eastern Passage, Nova Scotia
100,410	Craig Cornell, Greentown, IN
80,470	Brett Bias, Enterprise, AL
80,050	Matt Yentes, Urbana, IN

MR. DIG *(Computerware)*

8,987,000	★Brannon Baxley, Live Oak, FL
6,787,000	Jeff Roberg, Winfield, KS
3,533,650	Paula James, Lumberton, TX
2,261,900	Stephane Ouzilleau, Lauzon, Quebec

MS. MAZE *(Tom Mix)*

12,560	★George Frausto, Blue Island, IL

MUDPIES *(MichTron)*

77,900	★Erik Huffman, Rochester Hills, MI
66,700	Kevin Cornell, Greentown, IN

NINJA WARRIOR *(Programmer's Guild)*

108,000	★Eric Gladstone, Ocala, FL
106,300	Spencer Reeves, Baton Rouge, LA
68,100	Larry Strome, Humboldt, Saskatchewan
60,300	Scott Enman, Belle Mead, NJ
53,200	Mike McCafferty, Idaho Falls, ID
43,700	Mark dePierre, Mascouche Hts., Quebec

NUKE AVENGER *(T&D Software)*

128,125	★Chris Coleman, Meriden, CT

ONE-ON-ONE *(Radio Shack)*

986-22	★Toby Jacobs, Bellefontaine, OH
970-32	Wes Hill, Vashon, WA
910-58	Michael Lizardy, Oregon, OH
890-0	•Erik Huffman, Rochester Hills, MI
890-41	Mark Lang, Downieville, CA
802-60	Jeremy Hackworth, Rexburg, ID

OPERATION FREEDOM (THE RAINBOW, 8/85)

73,529	★Kirby Smith, York, PA
23,347	Ed Westberg, Jensen Beach, FL
19,614	Mary Edwards, Imperial, MO
18,882	Paul Walcott, Mt. Clemens, MI
12,673	Alexander Taday, East Lyme, CT

PANIC BUTTON *(Radio Shack)*

1,120	★Nathanael Heller, Kenner, LA

PEGASUS AND THE PHANTOM RIDERS *(Radio Shack)*

50,260	★Rodrigo Maldonado, Whittier, CA

PENGUIN (THE RAINBOW, 2/85)

48,250	★Paul Wagorn, Carp, Ontario
44,550	Kevin Gallagher, Santa Monica, CA
20,780	George Bodiroga, Eureka, CA
8,470	Joseph Tokarz Sr., Blossburg, PA
1,660	Robert Nicosia, Gloversville, NY

PLANET INVASION *(Spectral Associates)*

155,000	★Jimmy Doyle, Barrackville, WV
126,550	Thomas Mayor, Brooklyn, NY
67,700	Alan Drazen, Longwood, FL
58,650	Ghislain Chillis, Trois-Rivieres, Quebec
39,350	Paul Hotz, Herzlia, Israel

POLTERGEIST *(Radio Shack)*

7,430	★Myriam Ferland, Trois-Rivieres, Quebec
6,000	Billy Fairfull, Charleston, SC
4,840	Steve Thomas, Ogdensburg, NY
4,065	Joseph Tokarz Jr., Blossburg, PA
3,440	Bart Springer, Oskaloosa, IA

POOYAN *(Datasoft)*

3,785,000	★Ben Collins, Clemson, SC
1,987,000	Jon Sowle, Sanford, FL
1,253,200	Thomas Mayor, Brooklyn, NY
266,300	Pat Leathrum, Newark, DE
250,050	Andrew Reeves, Bothel, WA
81,850	Shawn Corway, College Point, NY
72,500	David Del Purgatorio, San Francisco, CA
55,900	Christopher Potts, Bowmanville, Ontario
29,700	Terry Parchem, Blue Island, IL
20,250	Wayne Dewitt, Blue Island, IL
17,560	Hugo Frausto, Blue Island, IL

POPCORN *(Radio Shack)*

165,180	★Matt Heinemann, Richmond, VA
116,630	Keith Aschemeier, Napoleon, OH
57,680	Melita Boudreault, Port-Cartier, Quebec
56,500	Bruce Johnson, Vavenby, British Columbia
50,210	Scott Swedis, Spencer, MA
37,760	Glen Bilodeau, Otterburn Park, Quebec
30,100	Paul Walcott, Mt. Clemens, MI

PRO GOLF *(Computerware)*

69	★David Esarey, Shelbyville, IN

PROJECT NEBULA *(Radio Shack)*

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150	Mariano Frausto, Blue Island, IL

QUE BIT *(Mike Ro Products)*

53,150	★Neil Edge, Williston, FL

QUIX *(Tom Mix)*

999,999	★Wilbur James, Charleston, WV
22,454	Mariano Frausto, Blue Island, IL
16,270	Mark Motel, Blue Island, IL

RACER (THE RAINBOW, 3/85)

301.9	★Kirby Smith, York, PA
283.4	Jennifer Woland, Silverdale, PA
17.6	Neil Edge, Williston, FL
15.0	Craig Cornell, Greentown, IN
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1,301,350	Brian Matherne, Gretna, LA
1,060,250	Pat Mulhern, Newark, CA
711,440	Tina Helfers, Sparta, IL

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931,250	Keith Smith, Bethany, Ontario
637,600	Chad McClellan, Rushville, IN
599,150	Douglas Hauk, Peoria, IL
547,800	Stephane Ouzilleau & Daniel Cloutier, Lauzon, Quebec
539,750	Gilles Gagne, Sillery, Quebec

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52,700	Alex Seliger, Lachine, Quebec
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50,000	Karen Goddard, Oshawa, Ontario
20,000	David Craft, Roanoke, VA
20,000	Ryan Devlin, Louisville, KY
20,000	Brian Voges, Jasper, IN

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587,600	Kevin Cornell, Greentown, IN
567,900	Jon Sowle, Sanford, FL
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347,600	Morgan Gregory, Aston, PA
190,000	Todd Hooge, Comox, British Columbia
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SKRAMBLE *(Tom Mix)*	
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— Debbie Hartley

SCOREBOARD POINTERS

In conjunction with THE RAINBOW's Scoreboard, we offer this column of pointers for our game-playing readers' benefit. If you have some interesting hints and tips, we encourage you to share them by sending them to the Scoreboard, c/o THE RAINBOW.

FEEDBACK

Scoreboard:

In answer to some questions asked by Tommy Crouser in the "Scoreboard Pointers" of the March 1986 issue, concerning *The Vortex Factor*, if you look at the battery, you will see one reason why the time machine does not work.

There is no water available, but fruit juice works just fine, although you have to squeeze your own. It also helps to read the notes on the theory of the machine while you are in it, and, of course, insert the correct cartridge.

To open the safe, you must turn the dial to the correct combination. The combination is a date found on a document, but you have to travel back in time in order to find the document.

Richard King
Plymouth, IN

Scoreboard:

In response to Donald Dare's letter (May 1986), concerning how to kill the wizard in *Dungeons of Daggorath*, you have to hit him three times with the Energy Ring and also hit him about 20 times with the Elvish Sword.

Don Grey
Austell, GA

Scoreboard:

In response to Scott Bellman's letter (May 1986), here is some help with *Zork I.* To inflate the raft, you must open the sluice gates. To open the gates, you must get the wrench from the maintenance room (be sure to push all buttons except the blue one and don't forget the tube of gunk and the screwdriver). Also, don't worry about the thief — you will confront him later on, but for now, let him take your treasures (be sure he takes the Jeweled Egg).

You *can* return to daylight by going up the chimney, but you can only carry up one thing. Also, try praying at the altar with the cotton. You will find yourself at the clearing, or behind the house. The trapdoor will now always stay open, so start to put the treasures in the trophy case.

Jeremy Hackworth
Rexburg, ID

Scoreboard:

In response to Scott Bellman's letter in the May 1986 issue, yes you can enter the temple in the game *Enchanter.* First be sure to save your position — you will need to cast the Ozmoo spell on yourself.

Mikel Rice
Panama City, FL

Scoreboard:

In response to Dan Franzen's question (May 1986) concerning jumping the pit in the game *Madness and the Minotaur*, there are two mazes. There are also two pits. The one in the corner of the room can be found in one maze or the other; it alternates after each game. You look at the pit in the corner to get different items. The other pit is in the center of the room — it does not alternate. You jump this pit and it takes you to the forest.

David Ford
Kaufman, TX

UNBELIEVABLE GAS MILEAGE

Scoreboard:

I just made a discovery while playing *Worlds of Flight*. One of my favorite things to do is to fly until I run out of gas and then glide to a safe landing. I landed (out of fuel) and without thinking about it I restarted the engine. Surprisingly, the engine started. At first I thought there was only enough gas to make it to the refueling area, so I refueled and took off.

I ran out of gas again and landed safely, but this time I restarted the engine and took off and flew. But, I did not run out of gas — I flew for three hours with the gauge reading empty. That's some gas mileage!

Christopher L. Cheshire
TAFB, CA

UNDOCUMENTED COMMAND

Scoreboard:

There is an undocumented command in the *Cyrus Chess* program. To get a printout of the board, press 'S' then 'S' again.

Reed Darsey
Mobile, AL

HOLD ON TO THE SACK

Scoreboard:

I have some tips for anyone who owns *Pegasus and the Phantom Riders* (they work better during Phase two and three and the Lagoons). Always stay at the top-middle of the screen. This way the Phantom Riders cannot get higher than you, leaving you in a perfect position to kick all rising riders.

I also have a correction on some advice submitted by David Rodriguez (May 1986, Page 146) for *Dallas Quest*. Although the advice was very useful, it had one flaw.

After bribing the monkey, make these moves: `DROP ALL`, `PULL CURTAIN`, `GET LIGHT`, `CLIMB LADDER`, `LIGHT LIGHT` and `DROP LIGHT`. Go east, then south and get the sack, mirror, pouch, photo and ring and drop all of them into the sack. Then climb the ladder and proceed with the moves given by David. The flaw in David's advice is dropping the sack the second time, because the sack disappears!

Speaking of *Dallas Quest*, can anyone tell me how to get the elephant (Roger) to cooperate at Dumbo's nest, or how to get the natives to let me pass at the cave entrance? How do you use the ring? When you type `USE RING`, the response is "How?" If anyone can help please write to the "Scoreboard."

Rodrigo Maldonado
Whittier, CA

FIGHTING KEYS

Scoreboard:

I have some hints for your readers who are fans of *Knock Out*. When fighting Canvas Kid, press the up arrow key (this puts your fists up) and then keep on pressing the '2' key. Be sure to stop punching when he stops or he gets more energy. Do not press the space bar when you have the "KO" sign. Sometimes using it is effective, but most of the time he beats you to it and throws in a couple of punches.

When fighting Ricky Rickshaw, all you have to do is hit the '2' key. He may reverse the situation if you use the space bar.

When fighting Farmer Fred, use the same method as when fighting Ricky Rickshaw. However, you may need to throw a couple of punches with the '1' key. If he throws a few punches in a row and you are unable to, dodge to the left and then immediately punch him.

When fighting Knock Out Kid, you should mainly punch with the '2' key. Dodging is not advisable — he is much faster than you.

Also, in *To Preserve Quandic*, what should I do when I get to the Snake Master?

I am totally lost on *Blackbeard's Island* and *The Vortex Factor.*

Also, how do I refuel my oxygen in the game *Mars-80*? Any help would be greatly appreciated. You can write to the "Scoreboard."

John Licata
Richton Park, IL

CRYSTAL BALL BENEFIT

Scoreboard:

I have some hints for *Temple of ROM.* You have to be in a big area for the bats to be killed. Also, if you get the crystal ball for 3,000 points instead of 1,500 points, everything is doubled until you kill the bat. The same thing happens when you escape from a bat through a "transfer portal" (the white dot with a circle around it).

You can press SHIFT and CLEAR to change the background color. To return to black background, press ENTER.

In *Cyrus Chess*, you must have your queen next to the computer's king. While your queen is there, it can't be taken.

Timothy Bishop
Jacksonville, FL

GREAT BALLS OF FIRE

Scoreboard:

In *Dragon Fire* you can acheive a higher score if you continue dodging the fireballs. In higher levels, keep dodging the fireballs and you will rack up many points. Remember, don't leave until the score stops increasing. You may want to stay away from the upper inside part of the castle for fear of being dusted or killed by the fireballs.

If anyone has solved *Pyramid* or *Madness and the Minotaur*, please send some clues.

Jermaine Jackson
Tallulah, LA

GOTTA THROTTLE

Scoreboard:

Here is a hint for *Lemans*: Use a joystick that is only four directional and hold the throttle down.

Robert Eering
Swift Current, Saskatchewan

To respond to other readers' inquiries and requests for assistance, reply to "Scoreboard Pointers," c/o THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We will immediately forward your letter to the original respondent and, just as importantly, we'll share your reply with all "Scoreboard" readers in an upcoming issue.

For greater convenience, "Scoreboard Pointers" and requests for assistance may also be sent to us through the MAIL section of our new Delphi CoCo SIG. From the CoCo SIG> prompt, pick MAIL, then type `SEND` and address to: `EDITORS`.

— Debbie Hartley

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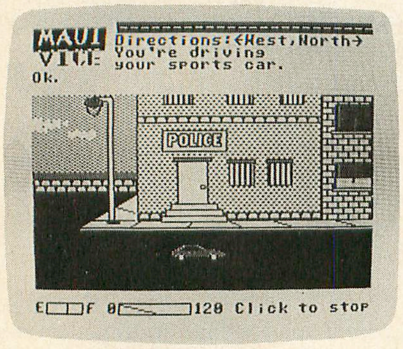

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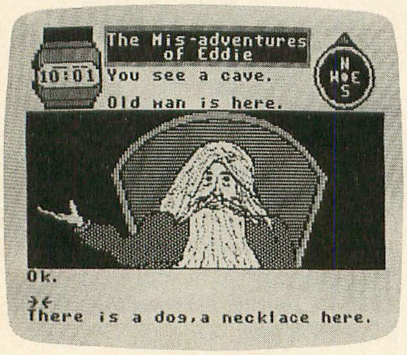

You see a cave.

Old man is here.

Ok.

><

There is a dog, a necklace here.

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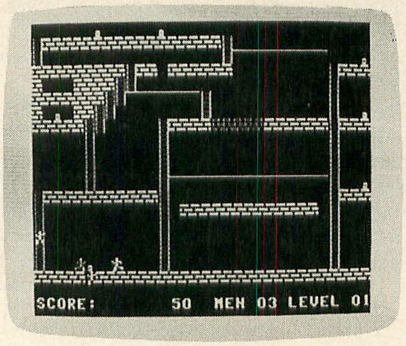

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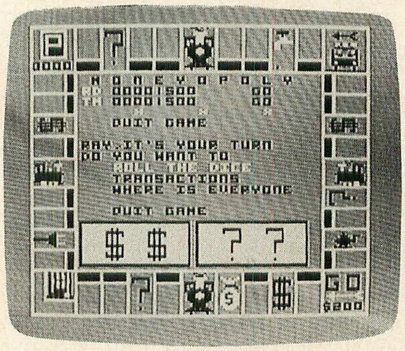

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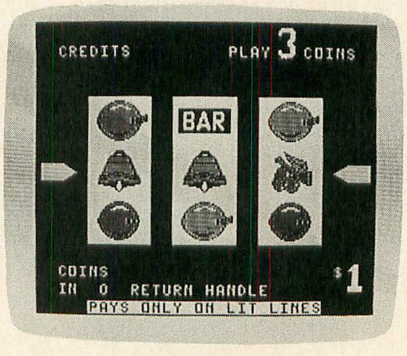

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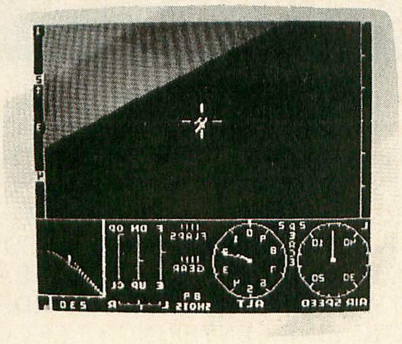

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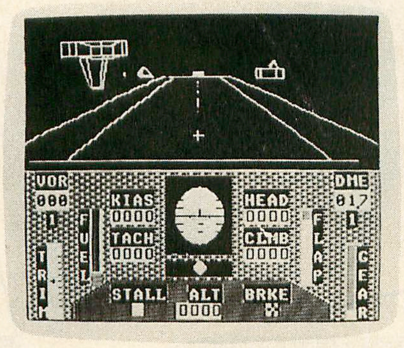

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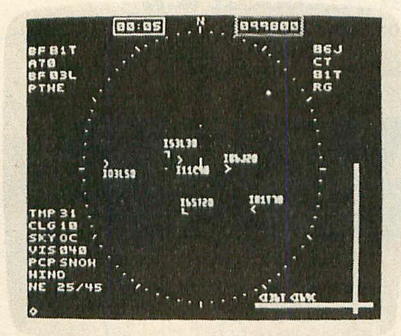

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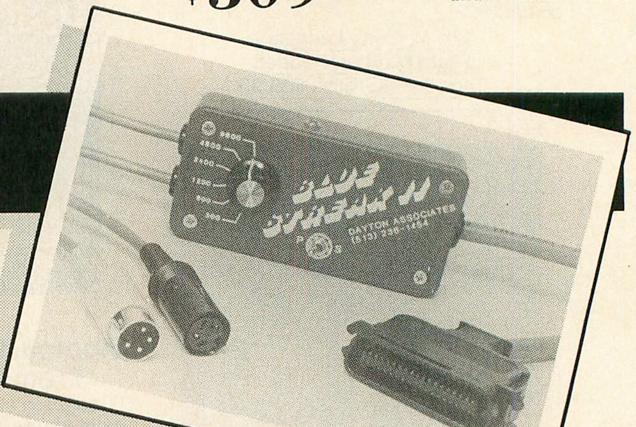
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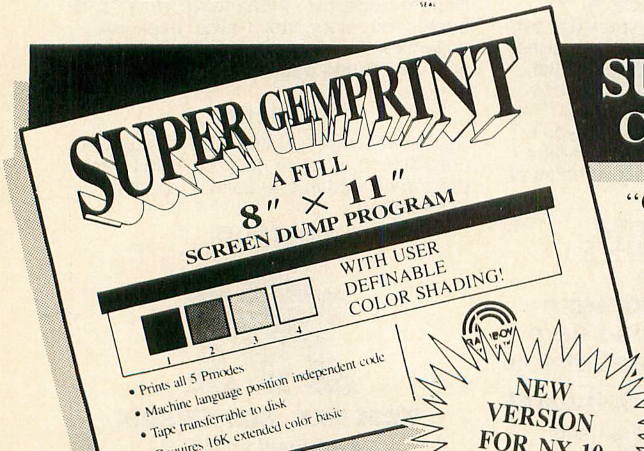
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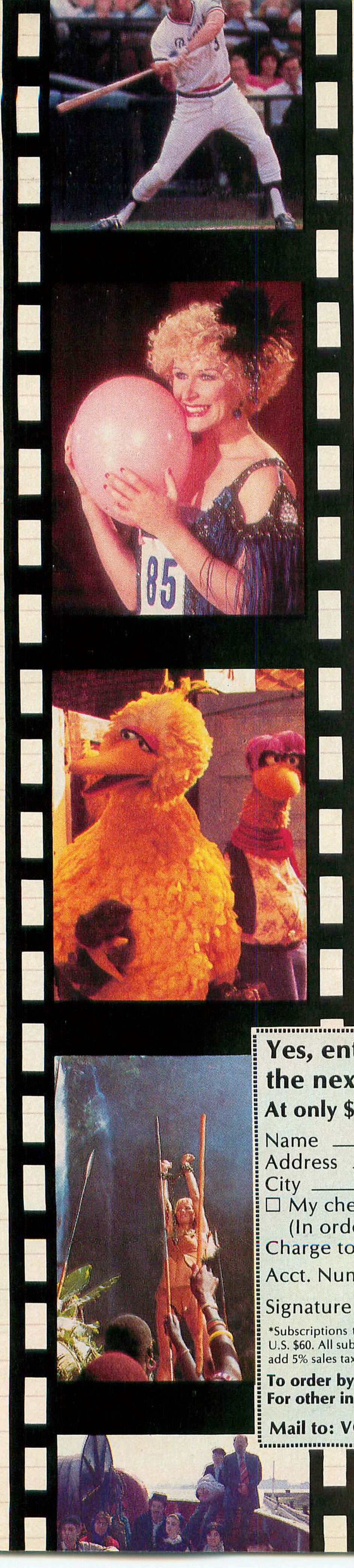

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RECEIVED & CERTIFIED

THE FOLLOWING PRODUCTS have recently been received by THE RAINBOW, examined by our magazine staff and approved for the *Rainbow Seal of Certification*, your assurance that we have seen the product and have ascertained that it is what it purports to be.

This month the *Seal of Certification* has been issued to:

OS-9 Pascal, a PASCAL language system designed to operate under the OS-9 operating system. The package includes the PASCAL reference manual and two disks. It is an implementation of the language according to the ISO standard 7185.1 Level 0. Exceptions and extensions are given in the manual. The package allows one to create and compile PASCAL programs into P-code. Translation of the P-code into native code is also allowed. ***Tandy Corp., available in Radio Shack stores nationwide, disk $99.95***

Probaloto Version 2.0, an improved version of a 16-32K ECB lottery program which is menu driven and incorporates mathematical formulas for weighing numbers either positively or negatively. New features include 'R' to reset, making it easier to reset the printer or size of the lottery; return to main menu after printing or setting up data file; exiting program without going to main menu; and selection of less than four numbers. ***Gary Olander, 322 Haymarket Place, Gahanna, OH 43230, cassette/disk $19.95***

C-Compiler, a package allowing C-language software development under the OS-9 operating system. This implementation is tightly based on the Kernighan and Ritchie standard. The reference manual discusses the specifics of this compiler, memory management using C and interfacing C programs with routines written in BASIC-09. Also included are two diskettes containing the compiler and the C library. ***Tandy Corp., available in Radio Shack stores nationwide, disk $99.95***

Bowling League Secretary, a 32K program that requires one disk drive and printer. This set of programs keeps team and individual statistics. Enter scores and statistics, and results are automatically printed out. Built-in backup files and data printouts maintained to recover from crashes. ***TOMELA*Co., P.O. Box 2162, Doylestown, PA 18901, disk $49.95***

PBBS 4.2, an OS-9 Bulletin Board System. Features include multiple message bases and download sections, four levels of access, private mail, XMODEM, 300/1200/2400 Baud, expandable operation. Message base size and access levels are definable. Works with any version of OS-9. Requires RS-232 program pack, multipack, OS-9 and BASIC-09, and auto-answer modem and 480KB of disk space. ***S.D. Roberson, 1702 West Mountain View Drive, Mesa, AZ 85201, disk $50***

The Color Filing System, a 32K filing system that requires a single disk drive and speech sound pack. ***Color Alloy Talking Software, 1124 Denney Drive, Duluth, MN 55805, disk $7 plus $3 S/H***

Telepatch II and Wizard, enhancements to *Telewriter-64*. *Telepatch II* is designed to allow the disk I/O portion of *Telewriter* to be RAM resident. Also has keyboard buffering. *Wizard* is a replacement character set for *Telewriter-64*. ***Spectrum Projects Inc., P.O. Box 21272, 93-15 86th Drive, Woodhaven, NY 11421, $29.95 plus $3 S/H***

Software Bonanza Package, create your own software package by choosing 12 of the following programs: *CoCo Checker, Multi-Pak Crak, CoCo Screen Dump, Disk Utility 2.1, Spectrum Font Generator, Tape/Disk Utility, Fast Dupe II, 64K Disk Utility, Spectrum Dos 1.0, CoCo Calendar, Schematic Drafting Processor, OS-9 Solution, Graphicom, EZ Base, Black Jack Royale 2.0.* ***Spectrum Projects Inc., P.O. Box 21272, 93-15 86th Drive, Woodhaven, NY 11421, $99.95 plus $3 S/H***

The *Seal of Certification* program is open to all manufacturers of products for the Tandy Color Computer, regardless of whether they advertise in THE RAINBOW.

By awarding a *Seal*, the magazine certifies the product does *exist* — that we have examined it and have a sample copy — but this *does not* constitute any guarantee of satisfaction. As soon as possible, these hardware or software items will be forwarded to THE RAINBOW's reviewers for evaluation.

— Judi Hutchinson

OTERM is a Pleasing Telecommunications Environment

And to think I believed I would be without an OS-9 terminal package. As SIGop of the RAINBOW Color SIG, I often require some method of downloading OS-9 programs. In the past, I have downloaded files using a terminal program running under Disk BASIC. Then I loaded OS-9 and Xcopied the files to OS-9. If I had only known then what I know now.

OTERM is a terminal program running under the OS-9 operating system. More precisely, it is a very pleasing telecommunications environment. It is as though you are sitting in the captain's chair with universal control at your fingertips. The only annoyance with program operation I was able to find is that *OTERM* uses OS-9's CLEAR key as the control key. Most other programs I have used operate with the down-arrow key as the control key. Once I was used to the difference, the world was before me.

On entering *OTERM*, you are presented with an options screen. This lets you alter the various communications parameters to suit the system you want to contact. These options include, along with the expected parameters, the ability to clean the incoming data (control word-wrap) and to strip linefeeds from incoming data before sending it to a file or the printer.

Once you have chosen the parameters, you may save them to a file for future use. You may also load a previously saved options file. The next time you go into *OTERM*, you may select an options file from the same command line used to call *OTERM*. This can come in very handy when you have several sets of parameters you use regularly.

Just as *OTERM* allows creating options files, it allows creating function key definitions files. There are 256 bytes of string space which may be divided among function keys one through nine in any manner wanted. You can set up one key to cause the auto-dial modem to dial and set up another to issue your username for logging in. For the sake of security, don't assign one key to send your password. Who knows what your friends might do with that information.

From the function keys menu, which is accessible from the command mode, you may add, kill, or display the setting for a given key. You can also save and load function key files to or from the disk. This allows changing the function key settings while online, giving an unlimited number of function keys. These files, just as the options files, may be loaded from the same command line by which you enter *OTERM*.

Perhaps one of the most beneficial areas of *OTERM* is the command mode. Just press CONTROL-ALT (CLEAR-'@') and you are ready to issue a single-key command abbreviation. If you do not remember all of the command abbreviations, just press 'M' and a command summary appears on the screen. The only fault I find with this routine is that you must remember the abbreviation you were looking for, go back to communications and use CONTROL-ALT to get back into the command mode to issue the command. This only occurs if 'M' is used to view the summary.

The command mode allows you to issue shell commands to OS-9, go to the function key menu and generally control other aspects of your communications. You may even tell *OTERM* to send a copy of the screen to the line printer. Keep in mind, though, that its power is possible only because of the operating system under which it is running. The same features would be difficult, if not impossible, to include in a terminal program under Radio Shack Disk BASIC.

File transfers are easily accomplished while using *OTERM*. The program supports both the buffer-capture method and downloading using the Xmodem protocol. Also, the capture buffer allows you to use the DC2/DC4 transfer procedure for automatic buffer control. Manual buffer control, however, may be used.

You can, of course, print, save, load and transfer the contents of the capture buffer. An interesting option, however, lets you get the screen. If you issue the G command for the buffer, whatever appears on the screen is appended to the contents of the buffer. This can be very useful for taking down bits and pieces of information from different places on a communications network. It can also be a time saver if you happen to forget to open the buffer before reading something online. Just issue the command and the information will be in the buffer.

Xmodem uploading and downloading is quite simple to use. Just instruct the remote computer to prepare itself, go to the command mode and issue the Up or Down command. You are prompted for whether the file is in binary or ASCII format. Then you are asked for a filename (pathname) under which *OTERM* is to store the file. Then transfer begins. As the buffer is filled, *OTERM* saves the old contents out to disk, thus allowing very large files to be transferred. You even have an abort option for Xmodem transfers, which is a feature most other terminal programs don't have.

If you get tired of the old 32-column screen, *OTERM* may be configured to work with the Hi-Res program of *O-Pak* from Frank Hogg. This modification is well documented, very simple to perform and gives quite acceptable results. Also, for those who own *Wordpack II* from PBJ, if you have installed the OS-9 drivers, *OTERM* will use the 80-column screen.

My only gripe with the *OTERM* package is the documentation. The expert may have few problems, but the novice may become frustrated trying to wade through the manual. In general, the manual is well-written. However, it does not give the user any way to tie all the information it contains together. A complete command summary would be very helpful in mentally compiling the information. As an experienced user of telecommunications, I found it quite frustrating that I was afraid to boot up the package without reading through the manual four times. It is true, however, that the program tends to pull the information together once it is running.

All in all, *OTERM* is an excellent package. Though it requires a Multi-Pak Interface and an RS-232 card, it includes more than enough features at a reasonable price. In my little black book, *OTERM* has four stars by its name.

(New World Technologies, Box 1209, Dublin, OH 43017, $39.95 plus $2 S/H)

— Cray Augsburg

Software Bonanza Package: What You Need is What You Get

A package deal of popular programs has been announced by Spectrum Projects that allows you to create your own Software Bonanza Package. You choose 12 programs from the following: *CoCo Checker, Multi-Pak Crak, CoCo Screen Dump, Disk Utility 2.1, Spectrum Font Generator, Tape/Disk Utility, Fast Dupe II, 64K Disk Utility, CoCo Calendar, Schematic Drafting Processor, OS-9 Solution, Graphicom, EZ Base, Black Jack Royale 2.0* and *Spectrum Dos 1.0*. This last program, *Spectrum Dos 1.0*, fixes a number of bugs inside the CoCo's ROMs, adds 24 new commands and gives the user a high-density screen of 32, 51 or 64 characters per line.

New commands are:
DOS — works just like the one in 1.1 Disk BASIC.
ERROR — Similar to an `ON ERROR GOTO` trapping routine.
FLEX — Boot up FLEX without the need of running a special boot loader.
RUNM — Single statement `LOAD` and `EXEC` of machine language programs.
PPEEK — Prints the 16-bit value of a specified memory location.
PPOKE — Stores a 16-bit value in a specified memory location.
AUTO — Automatically generate line numbers when entering a BASIC program.
INVERT — Reverse screen color.
NORMAL — Return to normal screen.
WAIT — A memory saving timer routine.
LMOVE — Copy and delete BASIC program lines.
RATE — Sets the drive seek rate for any or all drives.
TRACKS — Sets the number of tracks for any or all drives.
HELP — Lists all these commands onto a Hi-Res screen.
OLD — Restore a program that has been erased by `NEW`
FKEY — Define up to nine programmable keys.
LCOPY — Duplicate a BASIC line of code.
BREAK — Disable the BASIC key.
MEMO — A full text screen editor and screen dump to the printer.
FLIP — Invert the text screen.
EXIT — Return from Hi-Res to normal text screen.
ECHO — All output sent to the screen also goes to the printer.

New Features are:
35/40 track drives can be used.
Auto-disk search for all drives.
One button text screen dump.
One button loading of a BASIC program.
Lowercase Readable (commands can be in lower case).
Auto-key repeat.
New cursor (any printable character).
New prompt (anything you want).
Reset protected.

Fixed commands are:
DIR — Prints side-by-side directory on the screen as well as free granules.
DSKINI — Prints messages to let you know what it's doing.

All of the programs are individually packaged and contain ample documentation. Spectrum Products advertises this package for $99.95. That represents quite a bargain since the total package of 12 programs purchased individually would cost over $300. This is a good chance to increase your CoCo software library by choosing programs that fit your needs. Consult past issues of THE RAINBOW for further details and reviews of most of these programs.

(Spectrum Projects, P.O. Box 21272, 93-15 86th Dr., Woodhaven, NY 11421, $99.95 plus $3 S/H)

— David Gerald

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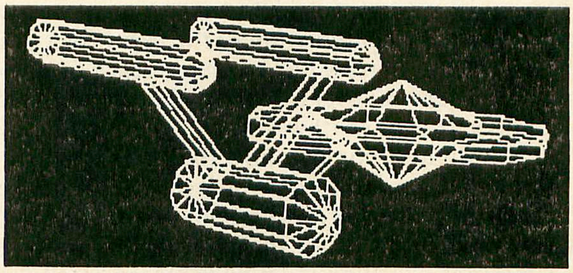

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Zork I is Out of This World

Ready for a trip to a place where the only limitations are those created by your mind? A dark, magical place where wonderful and sometimes horrible things happen? A place inhabited by elves, gnomes and other mysterious creatures? Then come to the Great Underground Empire of Zork.

Transportation to this place is via your imagination, the Color Computer and *Zork I*. What is *Zork I*? Infocom, the creator of Zork, refers to it as an interactive fantasy.

For those not familiar with interactive fantasies, they are stories in which you play the main character. Your own thinking and imagination determine the principal character's actions and guide the story. You are presented with a series of locations, items, characters and events. You interact with the story in a variety of ways: moving from place to place, becoming familiar with your surroundings, exploring locations and reading descriptions.

An important element of interactive fiction is puzzle solving. Encountering a locked door or a ferocious beast is a challenge to be conquered using certain items found by careful exploring as you travel.

The fun of *Zork I* is in surmounting these obstacles, finding fabulous treasures, avoiding being eaten by exotic creatures and solving diabolical puzzles in the Underground Empire.

Instructions are entered from the keyboard. The program tells where you are, reveals anything obvious you should know about the situation (the subtleties are for you to discover) and waits for a response.

A typical situation screen might read: "You are on a small, rocky beach on the continuation of the frigid river past the falls. The beach is narrow due to the presence of the white cliffs. The river crosses over the falls to the east and a narrow path continues to the southwest."

What you do next controls how the game interacts with you. You could choose to dig for treasure on the beach, continue on the path or sit down and have a beer. Sometimes what you want to do is not in the program, and you are given a message like "I don't know the word beer" or "that sentence isn't one I recognize."

However, it is amazing what the program will respond to. Once, when I was frustrated with a particular situation, I jokingly typed in `SCREAM`. Zork came back with a very satisfying "Aarrggghhhh!"

Conversations with *Zork I* are often bizarre. If you decide to put on the green calico hat, the response could be, "the munchkins giggle, but remain unconvinced that you're a witch." *Zork I* is also very flexible in the ways a command can be worded. Light Lamp, Turn on the Lamp, Turn the Lamp on, Activate the Lamp and Light the Brass Lantern all result in turning the lamp on.

There is more than one solution to this game. Measure your progress at any time by asking for the score. It increases as you solve puzzles, perform certain acts, visit certain locations and gather the various treasures hidden in the crevices of the Great Underground Kingdom. You also get points for putting treasures in the trophy case. You lose points if a thief steals the treasures or you are killed.

At any time, you have the option of saving your current position. This is highly recommended as there are times when rash moves result in sudden death. However, reincarnation is as simple as reloading the game to a position before your foolhardy move.

Saving is also necessary because *Zork I* is a long, complicated game. To master *Zork I* takes a lot of time, experimentation with different strategies and some plain dumb luck. Infocom will provide (sell, that is) an official hint book and map of the lands of Zork for those hopelessly caught in a quagmire.

The hint book is a jewel. The clues are revealed by rubbing the answers with a magic pen. Hints are often given in stages, in hopes the Adventurer will use his head rather than the book to solve the riddles.

Zork I is packed in a box that has enough teasers and goodies on it to thrill the hearts of Adventurers of any age. It is a book-type package containing the program disk, a storybook with the history of the Underground Empire, an operations guide and a nifty map written in an encrypted language.

Originally written for other computers, *Zork I* does not take advantage of all the CoCo's capabilities: no graphics, no sound, no speech. You have to use your imagination to visualize the game.

Zork I is a well thought-out, thoroughly debugged joy of a program. It requires a 64K Color Computer with at least one disk drive. If you are yearning for an Adventure trip to somewhere a little different, *Zork I* is for you.

(Infocom, distributed by Tandy Corp., available in Radio Shack stores nationwide, $34.95, Hint Book $7.95)

— Bruce Rothermel

Two-Liner Contest Winner . . .

This two-liner draws a line between two points which move around the perimeter of a circle at different speeds, or increments. After running it, you are prompted for three values: the increment for the first point, the increment for the second point, and the number of times the first point goes around the circle. Try it with several different values. It accepts non-integer values as well.

The listing:

```
0 PI=3.141593:DEFFNX(A)=(SIN(A)+
1)*128:DEFFNY(A)=(COS(A)+1)*96:A
=0:B=0:INPUT"INCREMENT FACTORS/T
IMES AROUND  (A,B,T)";AA,BB,T:PM
ODE4:PCLS:SCREEN1,1:FORX=0TOPI*2
STEPPI/AA/T:A=A+PI/AA:B=B+PI/BB:
LINE(FNX(A),FNY(A))-(FNX(B),FNY(
B)),PSET:NEXT:PLAY"L16G"
1 IFINKEY$=""THEN1ELSE0
```

Philip Edmonds
Kanata, Ontario

(For this winning two-liner contest entry, the author has been sent copies of both *The Rainbow Book of Simulations* and its companion *The Rainbow Simulations Tape*.)

TXD Is an Unusual Disk Zapper

Fred Kolesar wrote this disk-zapper program, *TXD*, using Disk ECB 1.1. The program is written mostly in BASIC, but it contains a few machine language routines embedded into the BASIC code. The machine code appears in tokenized form as comments at the end of some of the BASIC statements. This appears to be a variation of the familiar string-packing process in which tokenized machine-code routines are inserted into string variables.

TXD doesn't run under Disk ECB 1.0, but it does run properly in JDOS, and, with the high-speed `POKE` deleted, under the RAM version of ADOS.

However, once up and running, it works on disks that have been formatted by Disk BASIC 1.0. It can work on disks formatted by JDOS, but not everything works properly. And in any case, it can't read or write to any track beyond Track 34.

TXD is not copy-protected. The purchaser's name is built into one of the BASIC lines that contains the tokenized machine code and cannot be modified. There are two things that can be changed, if necessary, before saving *TXD* to the working backup disk. You can delete the high-speed poke and set the Baud rate for the printer.

I found the 10-page instruction manual to be a bit difficult to read due to numerous sentence fragments. But once I loaded the program and started using it, I found its operation to be straightforward, and I was able to learn its various functions without much difficulty.

One of the easiest things to do is alphabetize the directory. It is also easy to change the name of any file. *TXD* can copy data contained in any sector to any other sector on the same disk, or, if you swap disks, to another disk. (*TXD* assumes you have only one drive. Even if you set another drive as the default, all disk input and output will be done on Drive 0 only.)

The data contained in any sector is displayed on the screen, or can be printed in ASCII form. When editing the sector, the decimal value of any byte is also available. (Since any byte that contains an ASCII value of 32 or less appears as a space, it is important to read the decimal value carefully.) This differs from other zapper programs which show Hex values instead of decimal.

Another interesting feature is file tracing. With the directory on the screen, you can select any file for tracing. The trace shows the track and sector in which the file starts, the track and sector in which it ends, and the number of bytes used in the last sector. You may then exit the trace mode, or continue, in which case *TXD* goes through the file, sector by sector, with hard copy available if desired. (This is where there may be a problem with disks in the JDOS format. Unlike Disk BASIC, JDOS doesn't always store files in consecutive tracks. *TXD* will try to trace these, but sometimes picks up garbage sectors along the way.)

This trace feature makes possible what the manual calls the ultimate listing. If you save your BASIC program to a disk in ASCII form, a listing can be printed that shows the track and sector where each part of the program is stored.

TXD claims to be able to read Model IV and Tandy 1000 disks. I was unable to test that claim, but I did try a disk from an IBM PC, and was able to copy a couple of sectors to a CoCo-formatted disk. *TXD* cannot read the directory track of a Model IV disk, so complete instructions are supplied for making your own directory and allocation table entries for the files you want to copy for use on a CoCo.

TXD is not without its faults. I don't think it would take much effort to redo the manual and clean up the sentence structure and misspellings. Mr. Kolesar has chosen to place a `PCLEAR1` near the beginning of the program. So you may have to run the program a second time to get it started. (Alternatively, you could bring the program in by typing `PCLEAR1:RUN"TXD`.)

The manual states that anytime you specify a hard copy printout and the printer isn't ready, a printer not on message will appear on the screen, and the program will wait for you to either turn the printer on or change your mind. That's true some of the time. But if you're in the trace routine and the printer isn't ready, the program hangs up, and you'll have to Reset and run again.

One bug is the failure to trap erroneous use of the CLEAR key. In the edit mode, if you want to enter any value not available from the keyboard, such as ASCII 0 or 255, first depress the CLEAR key to get into the ASCII mode, then enter the value in decimal form. You remain in this ASCII mode until you press the ENTER key alone. But I erroneously pressed the CLEAR key again and it fulfilled its usual CoCo function of erasing the entire screen. Recovery isn't too tough, but you have to start editing the sector all over again.

TXD uses the BASIC `DSKI$` and `DSKO$` commands to read data from and write data to the disks, so any error will crash the program. For example, I had a disk with a bad sector, and when I tried to read that sector, the program ended with an I/O Error. When I tried to write to a write-protected disk, I got similar results. More sophisticated zapper programs are capable of reporting such errors and continuing, but then, more sophisticated programs aren't available for only $14.95.

(Kolesar B/S, 7 Ladd Road, Westfield, PA 16950, $14.95 plus $2 S/H)

— Neil Parks

CORRECTIONS

"What's the Diagnosis?" (February 1986, Page 67): Craig Bobbitt has written to tell us of a small error in his *MEMDIAG* program. When the LONG option is chosen, the variable TEMP, which tells the program when it needs to jump around the program area, is not initialized. The short-term fix for this is to always use the SHORT option first. Then TEMP will be initialized.

To correct the situation altogether, Craig suggests placing copies of lines 97 and 98 immediately following Line 159 in the source code.

For quicker service, Corrections will be posted on Delphi as soon as they are available in the Info on Rainbow topic area of the database. Just type `DATA` at the CoCo SIG prompt and `INFO` at the Topic? prompt.

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Vortex Factor is an Excellent Change of Pace

At 2:30 a.m. I realized it was time for a change of pace. My search for the Lost Secret of Charopangoland was proving useless. Unfortunately, I had been in this situation a million times before. Some unrecognizable monster, described only as "a snake" was attacking me. There I sat, stuck again. The dull green glow of the monitor illuminated the costs of an Adventurer's life: bloodshot eyes, a flat Pepsi, cramped fingers and a tired, confused look of disbelief. I'm stuck. I give in. I can't take anymore. Arrrgh!

Has this ever happened to you? This phenomenon known as jelly brains occurs after too many late-night Adventure sessions. Most know the best cure is to go to bed and try again tomorrow. Many times, however, that's not enough — a change of pace is needed.

An ideal change for Adventure addicts is Mark Data's newest release, *Vortex Factor*.

Vortex Factor, like other Mark Data Adventures, provides an excellent graphics backdrop for the storyline. Prospective Adventurers find themselves in a 21st century museum, complete with a non-working time machine and an assortment of apparently mundane objects. The purpose is to fix the time machine, gather treasures from past and future time, and bring them back to the present. Sounds simple, eh?

Actually, *Vortex Factor* presents a number of very difficult obstacles. Close inspection of every object is required and nothing should be left behind. Great care obviously went into the construction of the Adventure, making sure that puzzles aren't easily solved.

Although very enjoyable, the playability of *Vortex Factor* is somewhat paradoxical. The graphics are exquisite, but are certainly secondary to the text input of the game. It is frustrating when an object is clearly recognizable on the screen, yet is not supported by the text interface. The graphics are beautifully implemented, but are not necessary or even very helpful to the Adventurer.

The instructions provided with the game assist in loading the program and getting the Adventurer started, but are not meant to teach the entire vocabulary. A game save option is provided, but oddly enough, only saves to cassette on both the disk and cassette versions of the game.

I recommend *Vortex Factor* to anyone who prefers graphics Adventures to their text counterparts. *Vortex Factor* offers excellent graphics and storyline, but lacks some of the features of a straight-text Adventure. This is a necessary trade-off for a program that only requires 32K of memory.

Mark Data has done an excellent job implementing *Vortex Factor* on the CoCo, and it is a perfect change of pace.

(Mark Data Products, 24001 Alicia Parkway, #207, Mission Viejo, CA 92691, requires 32K, cassette $24.95, disk $27.95)

— Eric Oberle

Easy to Use *DSKUtil*: A Four-in-One Package

H.D.R. Software has released a series of disk utility programs that are useful for a 64K Color Computer system with at least one disk drive. Of the four utilities contained in *DSKUtil*, one requires an additional program that will be discussed later. The disk is unprotected.

The four programs that make up this utility are:

Backup — Unlike the CoCo BACKUP command, this utility uses the full 64K of RAM and only copies those disk sectors that are actually being used. This results in fewer disk swaps on a single disk system. This utility only works on standard BASIC disk files.

A feature I like is the option to select the head stepping rate on the drive. The program also lets you know if you try to backup either an unformatted disk or one with data already stored on it.

Diskfind — This handy utility keeps track of up to 3,000 disk files. It stores the information in a data file called DSKINDEX/DAT. This menu-driven utility is easy to use and features the ability to send the records to a standard 80-column printer in alphabetical order. You can also find a file using its file extension, or even parts of the filename.

Disk Check — This utility gives important information about a crashed disk using two options.

Option 1 checks an entire disk for bad sectors. If it locates bad sectors, the program enables you to construct "pointers" around them.

Option 2 analyzes the disk's directory. It displays a list of all files currently on the disk as well as killed files. It then displays a list of the granules used by each file in the order used and any errors present. It also displays the granule allocation table.

All the needed tools are provided to allow real disk file recovery and error correction using the Diskzap utility on the disk.

Diskzap — This program requires another program from H.D.R. called *The Enhancer.*

Diskzap provides two options. The first is a file information option. It displays the requested file in either ASCII or binary format. The second option allows changing the disk file information. A View mode is used to allow you to see what's going on by track, sector and granule. You can even send the information to the printer. There is also a help screen available.

DSKUtil shows a lot of thought on the part of the author and the result is software that is useful and fun to use. The documentation is ample and gives the user sufficient information to fully utilize the software. The optional *Enhancer* program normally sells for $18 but is $12 if ordered with *DSKUtil.*

(H.D.R. Software, 27 Doyle Street, St. John's, Nfld., Canada A1E 2N9, $39.95)

— Jerry Semones

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Easy Gradebook and *Easy Testwriter* have Potential

By Dennis Church

Easy Gradebook attempts to ease the complexity of recording and averaging grades for the classroom teacher. It is supplied on either tape or disk and facilitates saving and loading to either format.

In general, *Easy Gradebook* allows the entry of students' names and grades to compile a class list, the saving of that file to disk or tape, and reporting to either screen or printer. The class list file may be loaded, viewed and ordered alphabetically or by class average.

Actually there are two grade averaging programs. One accepts grade input in the form of 1, 2, 3, 4 and 5 for F, D, C, B and A. A second program accepts percentage grades.

Each of these assumes certain levels for letter grade equivalents to numerical averages. To change them, the author suggests either editing the program (he gives the line numbers to edit) or returning the program with a letter of explanation. He offers to do the editing at no charge.

Easy Gradebook is obviously a more developed program than *%Grade. Easy Gradebook* offers Baud rate selection (9600 or 600), repeated onscreen memory updates and the ability to select only failing averages (called smokups) for reporting.

Both *Easy Gradebook* and *%Grade* present menus of 10 items to the user:

1) Student Averages presents the names and averages to either the screen or printer.

2) Add A Student is the routine for creating the student list, and can also add more students to the current list.

3) Edit A Student Record allows changing the student name, changing any previous grade or adding grades.

4) Order sorts the class lists either alphabetically or by average.

5) Print allows printing the class list, grades and averages to the screen or printer. Single students may be selected for this feature as well.

6) Delete A Student does just that.

7) Print Subject Average reports the combined average grade of a particular class.

8) Redo A Student's Grades is designed to give the entire class a new set of grades, which is useful for averaging grades of the same class for a different subject or starting a new grade period with the same students.

9) Load File/Restart/Main Menu. It loads class lists, restarts the program (necessary if memory already contains a class list) and gives access to a main menu from which disk users can start one of three programs: *Easy Gradebook*, *%Grade* or *Easy Testwriter.*

10) Save File saves class lists and averages to either tape or disk.

The overall performance of the grade averaging programs is acceptable, especially for only $15. But they show a lack of polish and flexibility that teachers really need in software. Beyond the main menus, answering queries is sometimes accomplished by spelling the entire word, other times only the initial is necessary.

Some answers are indiscernable without listing the program. For example, choices for Baud rate are "1 or 87," but the program expects a '1' or '2' as the answer.

Editing a student's grade requires selecting the grade by number, but the screen formatting does not make that clear. Also, when editing a grade, the screen presents the grades only, without the student's name to confirm you are altering grades for the right student.

The three menu items that can lead to printer output use different prompts, which makes learning the program unnecessarily complicated. Startup of *Easy Gradebook* reports memory size, but it flashes by too quickly to read. When entering grades, however, it is reported after each entry, which is unnecessary since it does not change after each grade entry.

Loading a file to *Easy Gradebook* requires answering six or seven different queries. While the option to see the directory is useful, it is not made available on all disk access options.

For some reason, printing the students' grades produces in duplicate, two across, both to screen and printer. A better format is produced by a different print option.

Printouts that are longer than a page will not skip the 11-inch perforation. There *will* be long printouts, too, because from three to five lines are devoted to each student, depending on whether you choose to see just the averages or the grades, too.

On the positive side, all print options give the choice of screen or printer. Response to prompts is speedy and improper answers to prompts do not hang up the program. Viewing students' averages on the screen makes use of the arrow keys to progress forward or backward through the list. Grades entered as numbers are converted to letters automatically.

The ability to use percentage grades actually requires a second, modified version of the *Easy Gradebook* program. Both programs are included for the same price. Some of the quirks of *Easy Gradebook* are not present in *%Grade*, but it operates basically the same way. Disk users can select either program on startup so it would be easy to use both kinds of grade systems, which you may want to do for different subjects.

One-Liner Contest Winner . . .

This one-liner reverses whatever number you put in. Enter a four digit number at the prompt. The interesting thing is that it allows you to enter all four digits at the same time.

The listing:

```
10 CLS:INPUT"INPUT A FOUR DIGIT
NUMBER";X:T=INT(X/1000):H=INT((X
-T*1000)/100):E=INT((X-T*1000-H*
100)/10):U=X-T*1000-H*100-E*10:R
=U*1000+E*100+H*10+T:PRINT"THE R
EVERSAL IS";R:INPUT"DO YOU WANT
TO TRY AGAIN";Y$:IF Y$="YES" OR
Y$="Y" THEN RUN ELSE END
```

Tony Kimmel
El Monte, CA

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book of Simulations* and its companion *The Rainbow Simulations Tape.*)

Documentation is five sheets of typing paper in a plastic binder. It is a sparse explanation of all the menu items, some advisories about using the program and the details of changing the program to accommodate a different grading scale. There is, however, an additional source of documentation: a VHS format video cassette available for $10. The tape shows the screen while the software's author explains and demonstrates each option. The demonstration lasts fifteen minutes and is clear and informative. In addition, the tape also demonstrates the use of a second program available from this author, *Easy Testwriter.*

I can recommend *Easy Gradebook* if the buyer is willing to accept the program's flaws in exchange for its reasonable price. The potential buyer should realize it is not easy to add grades to an existing class list. It is not feasible to enter class grades until you want the final average.

I want to encourage the program author to add polish and flexibility. Then his program would appeal to a wider variety of teacher needs.

I cannot recommend, however, a second program, *Easy Testwriter*, which is designed to produce printed multiple-choice tests. It is available, along with *Easy Gradebook*, for $25 or $15 separately. Disk users with both programs may select either from an opening menu.

Easy Testwriter designs a multiple choice test which may be output to the printer and saved to disk. It also prints an answer key for the teacher. An interesting and potentially useful feature is the ability to combine previously saved test questions into a final exam.

Menu selection is straightforward and clear. Entering test questions, and correct and incorrect answers is clear. Viewing the questions after creation or loading is easy and quick. Editing the question is a valuable option, but the prompts are not at all clear when editing.

Easy Testwriter is flawed in the following ways. No provision is made for tests longer than one page. Skipping for page perforation must be taken care of outside the program. The Baud rate option, which the gradebook program has, is not present here.

The documentation says that true/false questions may be created, and I attempted three different two-answer tests. The program logic takes care of randomly placing the answers, but my tests always came out with the correct answer first, except for one question. This is not good pedagogy. Kids become more interested in the answer pattern than the question material after a few answers.

In creating a multiple choice test, the program performed well until I exercised the edit option. Then I got answers that appeared in the wrong question.

When attempting to merge tests to compose a final, some question lines were blank while other questions appeared as answers. Viewing before printing was no help since this did not show up on the screen version of the questions and answers.

As is the case with *Easy Gradebook*, this program has great potential if its flaws can be fixed.

(Teachers Are Us Software, 518 West 5th St., Peru, IN 46970, *Easy Gradebook* cassette or disk $15, *Easy Testwriter* disk $15, both $25, VCR documentation for both $10)

U.S. Stamp Inventory Management System Orders Collection Chaos

Many of us have collected stamps from time to time, but the wiser of us have maintained our collections and seen significant growth in value. In fact, as many financial advisors and publications tell us, stamp collections have improved in value in recent years, more than stocks, bonds, real estate and most other usual investments. As even those of us who just dabbled remember, there are thousands of different stamps of U.S. issue alone. How do we keep track of our inventory in today's electronic world? With the CoCo, of course!

Crockett Software, of St. Ann, Missouri, has developed a program for stamp management designed specifically for the CoCo. This program, called *U.S. Stamp Inventory Management System*, consists of three interactive programs, written in BASIC, which allow the collector to create a file of his stamps, inventory it periodically, update it and obtain printouts of his inventory and current retail value.

The program manual is well-written and easy to follow. It states that the program is written for a 64K CoCo 2 with disk drive. My review copy arrived on cassette tape with specific instructions for loading to two diskettes. Using a tape to disk program, I was able to follow the instructions for loading the three programs and four ASCII routines with no problems. Two diskettes are required. One for general (front of the book) stamps and the other for special (back of the book) stamps.

The programs are user friendly with Help commands and escapes throughout. The menus are very clear and allow foolproof operation from one program to another.

The manual states that "some modifications may be required depending on individual applications. If the customer finds it too difficult to make the required modifications, a one-time assist is provided by our company, upon return of the purchased system diskette along with a list of inventory file requirements and postage." This sounds like a fair offer to cover the possibility of specific collection differences. This program specifically addresses U.S. stamps only, but covers an incredible variety of parameters.

There are forty categories of general files shown, each of which can contain many individual issues. In each of those files, stamps are categorized under Scott or Minkus numbers (widely accepted catalogs). They are then subcategorized as singles, coils, sheet, strip, block and other forms. In addition, stamps are categorized according to condition such as, superb, very fine, damaged, mint, no gum, regum, etc.

The collector can create an inventory file using the first program, *Modify*, for thousands of stamps with their descriptions, condition, cost and retail value. He can also put into the files Want stamps not in his current inventory, to direct future purchases. The program is configured with 96 files possible. The collector can modify the file headings to reflect his particular collection.

The program allows updating stamp retail values through its *Retup* program, and also allows corrections and deletions as changes occur in the collection. It provides comprehensive printouts of total inventory with all categories listed, and a printout of total inventory cost, current individual value and total collection value.

All in all, I found this program to be very well put together, and certainly a valuable, if not vital, tool for any serious stamp collector. It is easy to use and maintain, and is well worth the purchase price of $44.95.

(Crockett Software, P.O. Box 1221, St. Ann, MO 63074, 64K disk required, $44.95)

— Mel Siegel

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At InterComp our objective is to support Midi hardware/software for the Color Computer to the fullest. Within the next year or so you can expect a variety of products such as librarian/patch programs (Korg, Yamaha, Casio, etc. . .), graphics editor and system exclusive software. Don't go out and buy another computer for your MIDI system!!!!! Our products are designed with the professional in mind, be it for studio, performance, home recording or music education. Here is the start of more to come!

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Book Review

Infomania — A Comprehensive BBS Guide

If you own a CoCo and a modem, more than likely you have logged onto some local and distant bulletin boards and sampled what they have to offer. If this is the case, then you have just barely scratched the surface of what is available.

Infomania, The Guide to Essential Electronic Services, by Elizabeth M. Ferrarini, gives information on over 250 services you can access with a computer and modem.

Most of this 314-page paperback book is divided into chapters that cover such categories as online stock brokers, up-to-the-minute news and weather reporting, electronic mail, job hunting, shopping and travel information.

Are you doing a research paper and looking for published information on a particular topic? Several services are listed that search one or more computerized databases for you. *Infomania* presents information on what each service has to offer and, in some cases, walks you through a sample session.

Most of these services do not come cheap. According to the book, some of the data searches may cost up to $100 an hour. The book also covers general services such as The Source, CompuServe and Delphi.

Infomania doesn't list the local numbers for the services, but usually tells whether you can access them via Uninet or Tymnet. A phone number for each service is provided for more information.

The first chapter is an overview of computer communications and the terminology used. The book is for anyone who has a computer or terminal and a modem.

(Houghton Mifflin Co., 2 Park Street, Boston, MA 02108, $14.95)

— Chuck Wozniak

One-Liner Contest Winner . . .

This routine draws the face of a clock and then gives you a taste of old England.

The listing:

```
1 PMODE4,1:PCLS:SCREEN1,1:LINE(1
28,48)-(128,96),PSET:LINE-(160,1
16),PSET:CIRCLE(128,96),50:PLAY"
V20O3L4CEDO2L2GP4L4GO3L4DEL2CP4O
3L4EDCO2L2GP4L4GO3DEL2CP4O2CP2CP
2CP2C"
```

Blake C. Hughes
Hahn, W. Germany

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book of Simulations* and its companion *The Rainbow Simulations Tape*.)

Software Review

Action and Challenge Define *Shock Trooper*

Just when you think the game writers have run out of scenarios, along comes a program that restores your faith in the future of space games.

Such a game is *ShockTrooper*, created by Mark Data, a long-time pacesetter in innovative programming. The challenges are seemingly endless and the difficulty level is enough to frustrate even veteran game players. It is complete with sound effects and the nice assortment of color graphics that we've come to expect in top-of-the-line programs.

In *ShockTrooper*, you are the squad commander and have received word that aliens are planning to conquer Earth. Your mission is to infiltrate the alien base and destroy it. You also must escape with parts from their new TRG-5 space saucer and return them to Earth scientists for analysis.

Four highly-trained shocktroopers are placed under your command, each supplied with the latest in attack equipment — electro guns, inviso devices and porta-bombs.

The alien base consists of mazes containing perplexing enemy defenses. Among these defenses are lasers, which emit powerful energy bolts; rotating lasers, which can be stunned but not destroyed; zaproid robots, which enter through an opening in the ceiling; and forcefields.

Your weapons are useless in the filter grids of the tunnel sections. The most important areas of the base are protected by rows of ceiling-mounted emitters that drop radioactive particles.

One of your most important weapons is the inviso device. It makes you invisible and protects you from laser bolts, radiation particles and zaproids. However, anytime you use the device or another weapon, your radiation level is increased and is indicated by a bar meter at the top of the screen. You die if the level reaches a certain amount.

The aliens have captured many of your troopers and imprisoned them in special brain-draining chambers throughout the base. You must disable each chamber to prevent the aliens from obtaining vital secrets.

The game consists of 14 screens that become increasingly fascinating and more difficult to negotiate. This is a quality game in every respect. Obviously time and care have gone into it. If you're looking for a challenge, I recommend *ShockTrooper*.

(Mark Data Products, 24001 Alicia Parkway, # 207, Mission Viejo, CA 92691, cassette or disk $24.95)

— Barbara Combes

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Advanced BASIC Programming Aid and *Super Programming Aid* are Great Values

By James Ventling

All of us have wished at one time or another that Tandy had added certain commands and capabilities. Anyone who programs in BASIC knows the CoCo is limited in its built-in functions.

When the CoCo first appeared with only 4K memory and Color BASIC, lines with bugs had to be completely retyped. Line editing appeared with Extended BASIC and life was made easier.

With more memory, programs grew larger and harder to manage. Some programmers tried using word processors to write their programs but had to use ASCII files and couldn't test run a program while using the processor.

From time to time, utilities have appeared to try to take care of one shortcoming or another, but having all the various utilities and programming aids contained in a single program has not been accomplished — until now.

Bangert Software Systems has put together a group of programming aids intended to fill the void. *Advanced Programming Aid* is a compact 2,752-byte, relocatable machine language program. It can be used with either a disk- or tape-based system and works with any ROM version. You'll need Extended BASIC and 16K memory or more, (it does not take advantage of the extra memory in a 64K system).

Using *Programming Aid* is very simple. If you're not using Hi-Res graphics you may want to first `PCLEAR 1`, particularly if you only have 16K. Type `RUN"APA"` (or `CLOAD` and `RUN` for tape). The next thing you see is the banner message and you are ready to use *Programming Aid.*

Programming Aid does not get in your way; you can use the CoCo the same as before. It doesn't require or impose any special restrictions or formats. You could ignore it and never know it was there — but you won't want to when you discover how useful it is.

The commands and functions are entered by using two keystrokes. First the control key (down arrow) is pressed, then the key for the command of your choice. I consider it a real convenience to be able to use one hand to enter commands rather than have to put down whatever I'm holding in order to press several keys simultaneously. This is just one example of the friendliness of this program.

Let's look at the functions this program has to offer.

Automatic Line Numbering — When you select this command a line number appears on the screen waiting for you to type in a line of BASIC. When that line is entered the next line number automatically appears. You have the option of specifying the start and increment values for line numbers, though the program will not let you run over existing lines. If you reach an existing line, the automatic line numbering stops. Each time the automatic numbering is interrupted, the program remembers where it left off and begins there again unless otherwise instructed.

Automatic Loading of Menu (Disk only) — If you have a menu program written in BASIC, you can load and run it with just two keystrokes. A check is made to be sure there is no program in memory that would be erased. There is a very simple menu program included for demonstration but it can be replaced with any BASIC program of your choice.

Keyboard Clicker — Each time you press a key it makes a clicking sound. This is an option I find very helpful when typing in code from a magazine listing. The click sound lets you know if a key is missed or hit accidentally without having to look up at the screen. If you don't want the click option you can turn it off.

Suspend — This is a very exciting feature. This command lets you suspend, or hide the program you are working on. Your program will seem to have disappeared. Now you can check the listing of another program, type in a new program, run another program, or anything else you like, all without interfering with the hidden program. The `RESTORE` command brings your original program out of hiding. This is also an easy way to merge programs. While the original program is hidden, you can load and edit an additional program. Any BASIC code left in memory is appended to the end of the original program when it is brought out of hiding.

Copy — The Copy command copies a line or a group of lines in your program. You specify the line or range of lines to be duplicated and where in the program you want the copy to go. Line numbers are automatically changed on the copy. A check is made to be sure you don't copy over or erase existing lines.

Move — Similar to the Copy command, the Move command copies a line or group of lines to a new location in the program. However, the original group of lines is deleted.

Find — If you've ever had to search through a long listing for something, then you will appreciate this command. Find allows you to search through a program for the occurrence of any string up to 17 characters long. The search string is remembered, so after finding one occurrence, you can enter the Find command to find the next occurrence without retyping the characters you are searching for.

Termination — You can eliminate *Programming Aid* without affecting your BASIC program (to execute another machine language program for example). Though the manual doesn't mention this, while *Programming Aid* is active, its functions are carried over into the running of your BASIC program (such as Key Click). More about this later.

Program Scrolling — There are times when I want to look at a program line by line. Tandy didn't provide any way to do this. *Programming Aid* not only allows you to scroll through a listing one line at a time, but you can view the lines in forward or reverse order. In addition, the scrolling starts with the line last worked on. With the Scroll command you may never use the old `LIST` again.

Repeating Keys — You are able to repeat any key (including the backspace) by just pressing that key and then holding down the CLEAR key. I found this to be especially useful when editing a line.

Basic Program Formatting — When turned on, this option takes a line containing multiple statements and lists each of those statements on a separate line, indented several spaces. This works for both the screen and printer and is even active as you are typing in a line. As soon as you type a colon the cursor jumps to the next line. I find it useful when printing a hard copy to share with others, and beginners may find it helps when debugging a program.

Clear Key Disable — You have the option of turning off the usual CLEAR key function. Accidently clearing the screen can be most annoying, especially if you are typing in a long line of BASIC. This is fairly easy to do since the CLEAR and the ENTER are side by side. With the CLEAR disabled you need never suffer this misery again.

Current Line Edit — This command automatically puts you in the Edit mode for the line last worked with. This saves time and typing since neither the usual Edit command nor the line number need be entered.

Command Keys — This is not a single function but a whole range of commands. You do have an option of whether or not to load the command keys table. It takes up approximately 280 additional bytes but it is worth it. By pressing the control key (down arrow) and then another key, a whole string of characters is automatically typed in for you. For instance, the letter 'A' gives you Audio O, 'B' gives Backup, 'C' gives Circle(, and so on. The command key table included contains 26 of these command strings (one for each letter on the keyboard). These command keys are easily remembered after a short time and save a tremendous amount of typing. A disadvantage is having all the keys predefined for you. For example, the 'Z' key gives `CLOAD"`. If you have a disk based system as I do, you would probably want to replace the `CLOAD"` string with something more useful. This problem is overcome with *Advanced Programming Aid*'s sister program, *Super Programming Aid.*

Super Programming Aid contains all of the above plus a program to create your own command key tables and a new loader which asks which table you want to use with the programming aid. Not only can you make a command key table tailored to your own specific needs and habits, but you can make a number of different tables for different purposes and situations.

Menus and prompts make it easy to build or modify a command key table. You can define as many as 36 command keys and each key can be assigned a string up to 250 characters long. If you like, a command string can end with a carriage return (the ENTER key) so that a command will automatically execute.

Though not mentioned in the documentation, I found the features of *Programming Aid* (when active) are carried over into your BASIC program. When the BASIC program is running, you will find that Key Click, Key Repeat, Clear Key Disable and the Command Keys are in force and operating. This opens up some interesting possibilities. You could even create a command key table for program responses.

Of course, these programs are copyrighted and you can not sell or distribute any portion of them.

Advanced Programming Aid and *Super Programming Aid* are very modestly priced and the value is excellent. This kind of quality software needs to be encouraged. If you like the program, tell all your friends but please don't give away illegal copies. At this price, everyone can afford to buy their own. Let's support the development of fine software.

The manual is clear and detailed. It includes a table of contents, technical information and a command summary page. Each function is fully explained and examples are given.

Once you have read the manual you will probably never need to refer to it again. Onscreen prompts, status messages and error messages keep you from getting lost or confused. Also included with the program is a customer-comment survey and a postcard for asking any questions you might have.

Though my description may seem long-winded, the programs are very simple and easy to use. I could not find any bugs or problems. Everything works with convenience and style. This is the kind of utility that should be included with every CoCo sold. For usefulness and value, *Advanced Programming Aid* and *Super Programming Aid* have my vote for best buy of the year.

(Bangert Software Systems, P.O. Box 21056, Indianapolis, IN 46221, *Advanced Aid* $24.95, *Super Aid* $29.95, tape or disk)

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Let your CoCo ease the task of managing your checking accounts with CAIS. Record deposits, checks, ATM transactions, interest, service charges and other debit/credit transactions. Reconcile and balance your accounts in minutes. Search and edit capabilities.

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(Reviewed in RAINBOW April '86 issue, pg. 185)

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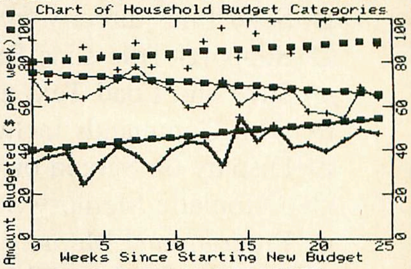

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HI-RES II SCREEN COMMANDER

Are you tired of looking at the 16 line by 32 character display on your CoCo? Do you wish you could see more lines and characters? Then HI-RES II is the answer, it can give you the big screen display you've always wanted. It will display 24 lines of 32, 42, 51, 64 and even 85 true upper and lower case characters per line without any hardware modifications.

HI-RES II is the most powerful screen enhancement package available for the Color Computer, yet it is the least expensive. It is completely compatible and transparent to Basic. Once the program is loaded, everything works the same as before, only you have a much better display to work with. It even allows you to have mixed text and Hi-resolution graphics on the same screen or have separate text and graphics screens. It also has an adjustable automatic key repeat feature and allows you to protect up to 23 lines on the screen. HI-RES II features over 30 special control code functions that allow you to change characters per line, protect display lines, change background color, position cursor, switch normal/reverse video, underline, double size characters, erase line/screen/to end of screen, home cursor, character highlight and much more. It works on all models of the CoCo with 16, 32 or 64K and provides automatic reset control so HI-RES II won't disappear when you press reset.

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EDT/ASM 64D
64K DISK EDITOR ASSEMBLER w/DEBUG

EDT/ASM 64D is a Disk based co-resident Text Editor & Assembler. It has a Hi-Resolution 51, 64 or 85 column by 24 line display, so you see your program listings easily. It also supports the PBJ 80 Column Word-Pak cards. The disk also contains a free standing Machine Language Debug Monitor, to help you debug your assembled programs.

The Editor in EDT/ASM 64D is the most powerfull, easy to use Text Editor available in any Editor/Assembler package for the Color Computer. It even has automatic line number generation for easy entry of program material. Some of it's features include:

- Local and Global string search and/or replace.
- Full screen line editing with immediate line update.
- Easy to use Single keystroke editing commands.
- Load & Save standard ASCII formatted Tape/Disk files.
- Move or Copy single & multiple text lines.
- Create and Edit disk files larger than memory.
- Hi-Res Text Display 28 to 85 columns by 24 lines.
- Supports the PBJ 80 Column cards Word-Pak I & II.

The Assembler portion of EDT/ASM 64D is the part that creates the Machine Language program. It processes the source file(s) created or edited by the text editor and creates a LOADM or CLOADM binary file on either Disk or Tape. Using library files you can assemble an unlimited size file, using several different disk drives.

- Supports conditional IF/THEN/ELSE assembly.
- Supports Disk Library files (include).
- Supports standard motorola assembler directives
- Allows multiple values for FDB & FCB directives.
- Generates listings to Hi-Res text screen or printer.
- Assembles directly to disk or tape in LOADM format.
- Supports up to 9 open disk files during assembly.
- Allows assembly from editor buffer, Disk or both.
- Full description text error messages.

DEBUG is a free standing program debugger which provides all the functions supported by most system monitors. Some of them include:

- Examine and change the contents of memory.
- Set and display up to 10 breakpoints in memory.
- Remove single or multiple breakpoints.
- Display/Change processor register contents.
- Dump Memory in Hex and ASCII format.
- Fill Memory range with a specified data pattern.
- Move a block of memory.
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Requires 32K and Disk $59.00

"The Source"

Now you can easily Disassemble Color Computer machine language programs directly from disk and generate beautiful, Assembler Source Code for a fraction of the cost of other Disassembler/Source generator programs. And, the Source has all the features your looking for in a Disassembler.

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- Disassembles programs directly from Disk
- Output complete Disassembled listing with labels to the Printer, Screen or both.
- Generates Assembler compatible source files directly to disk.
- Generated source files are in standard ASCII format.
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- Built in Disk Directory and Kill file commands.
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Generate Attractive Business Statements with *Keep-Trak*

Keep-Trak is a series of business programs from The Other Guy's Software. The first program in the series, General Ledger, was reviewed in the October 1984 RAINBOW. A later version was reviewed in April 1985.

Accounts Receivable is the second program in the series. It can be used in conjunction with General Ledger, or it can stand alone. I have not had the opportunity to try General Ledger, so this review of Accounts Receivable is based solely on its ability to stand alone.

Accounts Receivable sets up customer files (name, address, payment, credit limit, etc.), posts receivables transactions (purchases, payments, returns, etc.) to a journal, and prints out monthly statements that look very professional.

It is written in machine language, but some of the code is stored in files that seem to resemble BASIC statements. It requires 32K and at least one disk drive. If you have two drives, you can keep your program disk in one drive and a data disk in the other. The disk is not copy-protected.

The disk that I tested does not run under JDOS, but according to The Other Guy's catalog, JDOS-compatible versions of its products are available. I tried to use the program with the disk version of ADOS. Although at first it appeared to run properly, I soon discovered that some of the data files were being filled incorrectly. Entries of customer addresses were overwriting space intended for comment lines, and vice versa. With Disk BASIC 1.0, I had no problem.

The program is menu driven, and fairly straightforward in its operation. But the 48-page manual lacks clarity. On the subject of selecting a file starting date for customers with a past-due balance, we are told:

"This can be handled by the starting date being one month prior to the date that Customer Statements will be sent and adding the total amount owed and entering that amount into the Receivable Journal (program #3) or by having the starting date three months prior to the date that Customer Statements will be sent and bring the Receivable Journal up to date."

But if you wade through this verbiage, the program is not difficult to learn to use.

Step one is the creation of customer files. Customer files are divided into two categories, called installment files and non-installment files. In an installment file, a separate interest rate, late fee and monthly payment may be entered for each customer in the file. In a non-installment file, payment terms are the same for all customers in that file. (So it's possible to have a non-installment file of customers who pay their bills in installments — these are known as part principal due customers.)

You can have several files of either type, each with up to 999 customers (subject to available disk space).

Step two is entering the Billing Company data — that is, your company's name and address, and any comments that you would like to have printed on the statements. You can omit the name and address if statements are printed on letterheads. This information is entered for each file, which can be handy if your company does business under more than one name.

Step three is posting customer transactions to a Receivable Journal. You may use either a single-entry or a double-entry accounting method. If you use the double-entry method, you then have the opportunity to verify that the journal is in balance and to make corrections. In some cases it is better to delete an erroneous entry and re-enter it correctly, while in other cases it is better to make a correcting entry. In a few cases, trying to do either will cause problems.

There is a routine that automatically calculates interest and late fees due, but it has a problem, as explained in the manual:

"On Installment customer files, interest is calculated on the total amount owed. Therefore, if new charges are incurred on the 15th of the month and interest was last calculated on the first of the month, when interest is again calculated on the first of the next month, the interest calculated for the charges on the 15th will be for 30 days and not 15 days." The same applies for part principal due files.

Two methods of correction are offered in the manual, both of which involve calculating the interest for part of the month. But the program won't allow this. Once the interest calculation routine is run for a file, the old ending date becomes the new starting date, and it can't be changed. That is, if you've calculated interest from June 1 to July 1, the only thing you can do is calculate interest from July 1 to some later date.

After the journal is balanced and printed, the statements for each customer are printed. You can choose to print multiple copies. If you chose to reference a comment from the comment file, it appears with the transaction on the statement. Additional comments may be entered when the statement printing routine is selected. If the customer has a credit balance, the words "Credit Balance — No Payment Due" are automatically printed on the statement. I like that.

The statements list each transaction in chronological order, with a column for debits and a column for credits, as well as description and reference columns. These monthly statements are informative and easy to read.

Finally, the receivables are "aged." A report of past due customers can be displayed or printed, and mailing labels can be printed for sending notices.

Each journal file can hold about 1,500 entries, after which it must be consolidated — that is, all transactions will be replaced by totals for each customer and account number. You can print a hard copy of the journal before consolidating, or save the original file to another disk for future reference. (Consolidating can be done more often, if desired. You may want to have a consolidated journal for each month or each quarter.)

After pressing 'E' for end from the main menu, the OK prompt and a flashing cursor appear. At that point, any command entered produces a syntax error. Pressing the Reset button puts a message on the screen to the effect that The Other Guy's Software offers a reward to catch copyright violators. The only way to reactivate the computer is to turn the power off and then back on.

(The Other Guy's Software, P.O. Box H, Logan, UT 84321, 32K disk, $39.95 plus $2.50 S/H)

— Neil Parks

The Witness — A Classic Whodunit

Had enough of dungeons and spaceships? Need something that your spouse/parent can enjoy on the CoCo? Then try *The Witness*.

You have just 12 hours to solve a murder that may not even have happened yet, or face the displeasure of your captain.

The clues? A matchbook, a newspaper clipping, a telegram and a possible suicide note. The suspects? A sinister Oriental butler, a very independent rich girl, a business man, his dead wife's lover and others. Who did it? For that matter, who was the victim? If you're not careful, it could be you!

Infocom is well-known for involved interactive fiction programs which have been available for more expensive computers for several years. Now they have brought their experience to our favorite machine.

This program is flawlessly packaged with great documentation. One little extra I really appreciated was the resealable box that can hold all the little pieces of evidence that would probably soon be lost.

The Witness is a 1930s-style whodunit. You and the faithful Sergeant Duffy have to interview suspects, analyze evidence and accuse the perpetrator within the 12-hour time limit.

At any point, you have the option to save the work you have done so far. This is a good idea because, if you get bumped off, it is necessary to start over unless your position was saved at an earlier point.

This is not just another maze search. In *Witness*, you must logically solve a problem using interviews and police methods.

The action can be livened up with unlikely moves on your part. They will provoke some interesting responses from the other characters.

I predict that even seasoned mystery readers will not solve this problem easily, and jumping to a conclusion early in the game will probably have you pounding a beat in the boondocks.

The game is played by making choices and giving directions to the computer. Your choices at any juncture are numerous and so are the number of possible story lines. Your location (such as driveway entrance) and the time (e.g., 8:02 p.m.) are continuously displayed and updated along the top of the screen.

(Tandy Corp., available in Radio Shack stores nationwide, requires 64K, $34.95)

— John McCormick

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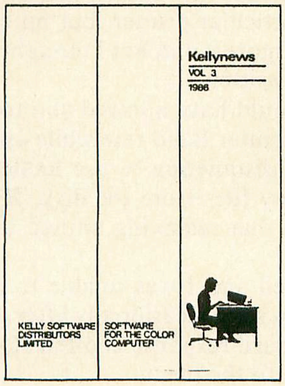
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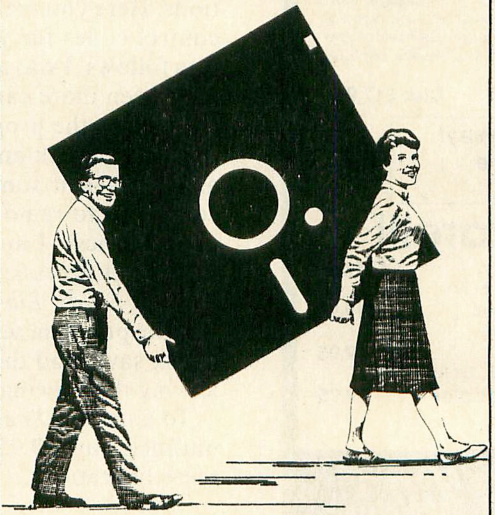

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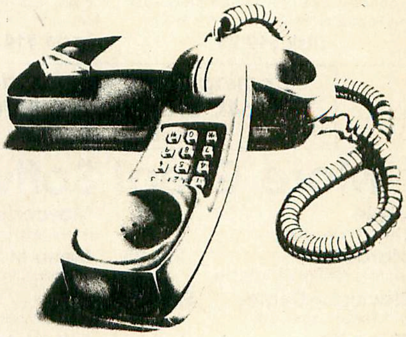

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By Scott Cabit

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Tape $21.95 Disk $24.95

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By Art Martin

Another great animated graphics adventure! All you came down to the Yacht Club for was to get a drink and maybe play a little poker. Heck, nobody would ever guess that the closest thing you owned to a real yacht was the one over your fireplace. It was in the bar that you heard rumors of earth-shattering events about to take place. You step out onto the wharf to get a little air when your natural curiosity and sense of adventure start to work...Can you save the world? Superb graphics, save & load feature. 64K, one disk drive required.

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Snap Study System Records Notes and Ideas

Cozy Software's *Snap Study System* keeps track of your mental ramblings in a rather elaborate file consisting of boxes, main files, subfiles and items. You have the options to save your ideas to disk, print a hard copy, and change or delete as needed.

From our sample file we learn that the subject box can be divided in up to eight main files. Each one of the main files can, in turn, have up to eight subfiles, which can have up to eight items. All this information can easily be entered or examined by using the arrow keys in a manner like many spreadsheet programs.

For example, if I wanted to keep track of jobs to do, I could first divide the Jobs box into up to eight parts. There could be one part for home jobs, one for at work jobs, one for moonlighting jobs and so forth. These are the main files. Now I can take the Home main file and divide it into eight more sections, such as in what parts of the home these jobs are located. And then, under these subfiles, I can enter up to eight items, such as what needs to be done. I can continue this for all of the main and subfiles if desired.

To view this at a later date, just select the Jobs file and scan through it.

It may sound like this program will take weeks to learn, but this is not the case. *Snap Study System* is extremely simple to understand. The program is written in BASIC, comes on a disk and requires 32K and one drive.

The documentation is a 13-page booklet that we found wanting. For example, if you follow the directions in the startup procedures, you won't be able to make use of the example files. Also, if you press the keys as you read along, a prompt asking if you want memory cleared appears a step or two before the documentation tells you about it. These are minor errors, and the rest of the documentation and the program itself are quite easy to understand.

My main complaint involves the Print Report instructions. Here you are advised that you are able to enter printer control codes for your particular printer, but no explanation follows. I was able to figure it out, but I thought it could have been more carefully written.

I believe the program could have allowed you to change the drive default and the printer Baud rate while operating, and I found it somewhat disquieting to use BASIC's `KILL` command to remove empty files from the disk. However, in all fairness, I must add that removing unused or empty files is not necessary.

Snap Study File ran well and I was unable to crash it. But the program seemed to stall occasionally after aborting a disk save, and the keyboard response is often slow when leaving the viewing screen to the menu.

To sum up, *Snap Study File* is an easy-to-master filer/outliner, but $19.95 may be a little steep for a program with these limitations.

(Cozy Software, 25142 53 Avenue, Aldergrove, British Columbia, Canada V0X 1A0, disk $19.95 plus $2 S/H)

— Bill Tottingham

Formatting BASIC Listings with *Listaid*

Listaid is a BASIC program that creates a machine language routine to format BASIC listings. It breaks up a line of BASIC so that each new statement starts on a new line and is indented. The minimum requirement is 4K Color BASIC 1.1. OK, I've seen a few of these before, let's try it.

The first thing it wants is a start location. There isn't a default value and none is given in the documentation.

The top of RAM for my machine is 32767 so I'll try 32700. Ah ha, the program didn't like that. It told me that number was too high. I'll try 32650. That works.

The program now wants to save the program. I choose disk and name it *Listaid.* Now I'll `LOADM` it and see if it works. Wait a minute. The instructions say I need to clear memory before executing the program. Let's see, `CLEAR 200, 32649`. Now to `EXEC` and list some BASIC code:

```
5 A1=0
 :B1=0
  :C1=0
   :D1=0
```

That worked fine. Let's try some more:

```
10 IF A1=1 THEN A1=2 ELSE IF B1=
1 THEN B1=2 ELSE C1=1
```

Oh, *Listaid* doesn't recognize the `ELSE`, only colons. Let's try something else:

```
20 AP$="VALUES CONTAINED IN VARIABLES
: A1, B1, AND C1 ARE TEST DATA"
```

Hmm, I didn't type all those spaces in the middle of Line 20. *Listaid* doesn't seem to know the difference between a colon that separates statements and a colon within a string.

I'd better check the `EDIT` mode. Good, the `EDIT` mode is unaffected by *Listaid.* With `EDIT`, I can see that Line 20 doesn't really contain all those spaces.

I wonder how to turn *Listaid* off. The instructions don't say anything about it. I think I'll try `EXEC` again. Bad news, typing `EXEC` a second time causes the computer to lock up and Reset doesn't help. That could be a big problem if you forget and do it again. You could lose all your code.

Now for the real test. Does it work with different printers? Great! It does work. Evidently the program must use ASCII.

Listaid works well onscreen or with any printer. The $10 price is very reasonable, too.

(Neat-O-Software, Jerry D. Forsha, Rt. #3, Box 205, Kingsport, TN 37664, $10 plus $2 S/H)

— James Ventling

An Introduction to the Doctrines of Grace

An Introduction to the Doctrines of Grace is a disk full of ASCII files that make a book when printed out. It is one of two books written by Pastor Mark Camp of Sovereign Grace Software.

Pastor Camp's letter to the editor in the March 1986 issue of RAINBOW said he would make a copy of these books for anyone who sent him the disks. He received so many, he decided to buy a bunch of disks and sell them with the books on them. Pastor Camp said he is not doing this for the money, but he cannot afford the time it takes to copy them.

The documentation is complete. Required is a word processor that can handle up to a 20K buffer and a printer. If you do not have a word processor, there is a BASIC program on the disk that will print it out for you.

It is advisable to have a word processor with margin settings because word break dashes are inserted at the end of many lines. He gives you the margin settings that work the best.

Pastor Camp has put Bible references within the book to allow easy checking.

Though the book is copyrighted, he encourages people to share it with others. He asks only that you tell the recipient to consider a donation to his ministry.

Everything about this software is great. I advise you to check it out. It is very good reading.

(Sovereign Grace Software, 221 Highview Drive, Ballwin, MO 63011, $10.95 plus $1.50 S/H)

— Bill Krauss

One-Liner Contest Winner . . .

This file creates the famous Yin and Yang symbol on the `PMODE 4` screen.

The listing:

```
10 PMODE4,1:SCREEN1,1:PCLS1:COLO
R0,1:CIRCLE(128,96),90:CIRCLE(12
8,141),45,,1,.75,.25:CIRCLE(128,
51),45,,1,.25,.75:CIRCLE(128,138
),20:CIRCLE(128,48),20:PAINT(128
,20),0,0:PAINT(128,138),0,0:FORX
=1TO1000000:NEXT
```

Charles Lammers
Yakima, WA

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book of Simulations* and its companion *The Rainbow Simulations Tape.*)

New and Improved: OS-9 Version 2.00

OS-9 version *2.00* is an update package for earlier versions of OS-9. It consists of two disks (an updated system disk and a new boot/config disk) and an 81-page booklet describing the changes made to the original system disk as well as the new utilities.

The most obvious change in the package is the addition of the *Config* utility. This program allows you to create a new system disk with only the drivers and modules you choose. To use *Config*, boot OS-9, then change disks inserting the boot/config disk in /d0. At the OS-9 prompt, type `/d0/cmds/config`. The utility then displays a menu and asks if you want to use one or two drives. After answering, you are given a choice of devices to be included on the new system disk. The list of choices is quite extensive and includes some surprises:

/term 32	standard TV 32-column display
/term 80	optional 80-column video display
/d0	floppy disk Drive 0
/d1	floppy disk Drive 1
/d2	floppy disk Drive 2
/d3	floppy disk Drive 3
/h0-15	hard disk Drive 0, 15 meg
/h0-35	hard disk Drive 0, 35 meg
/h1-15	hard disk Drive 1, 15 meg
/h1-35	hard disk Drive 1, 35 meg
/p	printer using standard RS-232 port
/t1	terminal using standard RS-232 port
/t2	terminal using optional RS-232 pack
/t3	terminal using optional RS-232 pack
/m1	modem
/m2	modem
/ssc	speech/sound cartridge

After selecting the devices, the user must also select the I/O routines and the power line frequency (60 hertz U.S.A. or 50 hertz Europe). The user also chooses the command set for the new system disk: (N)o commands, (B)ASIC commands, (F)ull command set, (I)ndividually select commands, or (?) receive help on command choices.

After making the appropriate choices, the user is prompted to insert a formatted disk in Drive /d1 for a two-drive system or Drive /d0 for a one-drive system and the process completes itself except for disk swaps necessary on a one-drive system. I was a little disappointed to find the new system disk was not bootable from Disk BASIC, but that can be remedied using the *Cobbler* utility.

Another new feature is optional DOS Help. This consists of two files. The first file is the *Help* program itself. It must be copied from the boot/config disk CMDS directory to the /d0/cmds directory of the system disk. The *Help* program uses the data file CMDS.HP which must be copied from the boot/config disk to the /d0/sys directory of the system disk.

Once the *Help* files are in place, the user simply enters at the OS-9 command line `HELP` plus the command he wants help with. The program supplies information about the command and the necessary syntax.

The third new utility is *Iniz*. It is intended to initialize a port or other device at the start of an OS-9 session, forcing the allocation of buffer space before other programs use it. Forcing allocation early in the session prevents memory fragmentation which can rob the system of valuable RAM.

The program resides in the /d0/cmds directory. It is called, preferably from the Startup file, by *Iniz* devicenames.

The fourth new utility, *Tuneport*, is my favorite. This program sets the loop counter for the serial port enabling the user to work at a higher Baud rate. *Tuneport* resides in the /d0/cmds directory. To call it, the user types `TUNEPORT /p` or `TUNEPORT /t1` to set the delay times for either the printer or the terminal.

The utility presents the current Baud rate, sends a test message to the printer or terminal and asks the user for a new value. If the message was successfully transmitted, the user replies with a carriage return. Otherwise, the user must supply a new value to try. This continues until the proper delay time has been established and the program ends with a carriage return.

If the user wants the change to be permanent, he must run *Cobbler*.

Several utilities have been changed in version 2.00. Most of the changes were made to accommodate the 80-column screen.

There have been other changes too. All keys are self-repeating. When a key is pressed for more than one second, it automatically repeats.

The '@' key now acts as the 'ALT' key. This adds 128 to the ASCII value of a key pressed.

The Getstat function now gives values for several key combinations that were missing.

FORMAT has been changed to allow almost unprompted formatting of disks.

And finally, OS9GEN has been changed to allow those with single drives to use it. In previous versions only *Cobbler* was available without two drives.

I received OS-9 version 2.00 as an addendum, not as a complete package. I don't know if it is available any other way. The documentation is quite good. The changed modules are examined in detail as are the new facilities.

Overall, I had trouble with only one instruction. The manual says to insert the config/boot disk in /d0 with the execution directory set to /d0/cmds and to type `CONFIG`. When I did this I got an error message. Typing `/d0/cmds/config` worked well.

If you don't own a previous version of OS-9, I recommend you try to get a complete package. The documentation is not meant to be a complete guide to the OS-9 operating system and the manual supplied assumes the user already knows the basics of OS-9 use.

I like OS-9 version 2.00 very much. I wish the authors had included an option to make bootable disks with the *Config* program. The *Tuneport* program worked like a champ and my printer now hums along at 9600 Baud. All of the programs written for earlier versions of OS-9 ran perfectly.

I recommend OS-9 version 2.00 highly. It is refreshing to find something new and improved.

(Tandy Corp., available in Radio Shack stores nationwide, 64K, one disk drive and OS-9 required, $69.95)

— Larry Goldwasser

Let CoCo Pick the Winners with *Enhanced Racing Analysis Package*

Whether you live at the track or are just a casual racing enthusiast, the *Enhanced Racing Analysis Package* from Software Exchange is what you're looking for.

This racing handicapping software can help predict favorable horses for betting when you visit the track. According to the documentation, this program picks winners in the money 70 percent of the time.

The program comes on cassette or disk. I examined and reviewed the cassette version, which comes with a copy on both sides of the tape, and two sheets of documentation for loading and running the program.

After `CLOAD`ing and typing `RUN`, a menu screen appears with four choices: Thoroughbred Racing analysis, Harness Racing analysis, Bet Return analysis and End.

The Thoroughbred Racing analysis consists of various prompts requiring knowledge of the horses involved for each race. Factors such as track length, number of entries, post positions, morning line odds, speed rating information, last positions in stretch run of last three races and final positions at end of the last three races run by the horse are needed.

With these factors, the program produces a rating for these horses, which can be used with your personal hunches to, hopefully, produce a winner at the track. All of the information required can be found on a racing sheet.

There are two items worth mentioning about the thoroughbred portion of *Enhanced Racing Analysis*. On the menu screen for track length, there are two entries for a track length of one mile. Both items nine and 16 had this listing. It seems that item 16 should have been two miles.

In my opinion, another item that could have been included is the track variant, an important factor relating to the conditions of the track (dry, muddy, etc.) on which the speed rating is determined. Many racing fans consider the track variant when looking at the speed rating. *Enhanced Racing Analysis* does not seem to consider this factor in the final ratings of the horses.

The Harness Racing analysis portion of the program has basically the same format. Information required about the horses includes track length, number of entries, post position, time in last race for each horse (minutes and seconds) and best time of last three times. It also produces a rating of the horses that can be used with your hunches.

Both the thoroughbred and harness racing choices also provide for an optional printed copy of the ratings that could be taken to the track.

The Bet Return analysis is a routine to determine your financial status from your bets. It provides a simple gain/loss calculation based on the amount bet for each race.

Overall, the *Enhanced Racing Analysis* is a straightforward program. Although not specifically mentioned in the instructions, the program should run in 16K or larger machines. According to a note on the instruction sheet, this program is for entertainment purposes only with no guarantees that it will always produce a winner. The instructions given with the software are adequate to get the program up and running.

This program would be of interest to those CoCo users who are avid horse racing fans since its price of $49.95 may be a bit expensive for the general CoCo user. However, just one great night at the local track could pay for this program quickly. Now, where's that racing sheet for today's races?

(Software Exchange, P.O. Box 5382, W. Bloomfield, MI 48033, cassette or disk $49.95 plus $2 S/H)

— Donald A. Turowski

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Telepatch II and *Wizard* Expand *Telewriter-64*

A revised version of *Telepatch* called *Telepatch II* has been released and offers some nice improvements. Most notably, *Telewriter-64* can be configured to have the disk I/O resident in RAM or loaded in from disk as currently done. This really makes *Telewriter-64* shine since disk I/O is instant. In effect, it becomes a RAM Disk and is lightning fast.

However, there is a price to pay for this convenience and that price is memory. Specifically, the buffer is reduced from the usual 24,889 characters to 20,793.

The *Telepatch II* disk contains a program called *PATCHR/BAS* that gives you this option during configuration.

Another new feature is the addition of a buffered keyboard. One of the problems with the original *Telewriter* was it had a tendency to occasionally drop characters, especially during the insertion mode. This new version totally cures that old bug. A new keyboard routine remembers what characters have been typed.

The most obvious change is all of the cassette choices on the main menu are no longer visible. The choices `Read In`, `Save`, `%save`, `Append` and `Verify` are still there and fully functional; you just can't see them. This was done to reduce confusion with the corresponding disk functions. Besides, *Telepatch II* only works on a disk system.

One other nice feature is the addition of a characters used count and space available as part of the disk menu. The other features such as key repeat, key click, visible carriage returns, overstrike mode and disk drive stepping rate are just like the original *Telepatch* and can be configured in the boot program.

If you like *Telewriter-64* as much as I do, you will love what *Telepatch II* adds.

If *Telepatch II* isn't enough, how about *Wizard*? *Wizard* is a well-done character set that replaces the standard character set in *Telewriter*. It features nicely-shaped characters with a touch of curl and true descenders. *Wizard* works on any version of *Telewriter-64* including 16K.

Although the program works well, I found the loading process for disk to be a little clumsy. You must first load and `EXEC` *Telewriter* in order to get the original character set into memory. Then you open the disk drive door and select disk I/O thus forcing an I/O Error. Next, type `CLEAR 10`, then load and run *WIZ.BAS*. This brings up the *Wizard* title page and loads the new character set into memory. I don't like the idea of forcing a disk I/O, especially by leaving the drive door open.

I discovered that after selecting the disk I/O and BASIC from the menu, I could then load and run *Wizard*. I then typed `EXEC` and pressed the Reset button.

Either works fine, but I would like to see a more user-friendly way to use this otherwise fine character set. Neither *Telepatch II* nor *Wizard* are copy protected, so back-up copies are easy to make.

I think these two programs are excellent choices for the *Telewriter-64* user. The price is reasonable and both are availabe for the package price of $29.95.

(Spectrum Projects, Inc., P.O.Box 21272, 93-15 86th Drive, Woodhaven, NY 11421, $29.95 plus $3 S/H)

— Jerry Semones

BASIC COMPILER

WASATCHWARE believes that users of the Color Computer deserve the right to use all 64k of RAM that is available in the computer, and have fast machine language programs that use the full potential of the 6809 microprocessor. That is why the BASIC compiler, called MLBASIC was developed. Here are some of the reasons that make this compiler one of the best bargains in this magazine:

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2. Program Control Commands
CALL END EXEC FOR STEP NEXT GOSUB GOTO IF
THEN ELSE ERROR ON..GO RETURN STOP SUBROUTINE

3. Math Functions
ABS ASC ATN COS CVN EOF EXP FIX INSTR
INT LEN LOG LOC LOF PEEK POINT PPOINT RND
SGN SIN SQR TAN TIMER VAL

4. String Functions
CHR$ INKEY$ LEFT$ MID$ MKN$ RIGHT$ STR$ STRING$

5. Graphic/Sound Commands
COLOR CLS CIRCLE DRAW LINE PAINT PCLEAR PCLS PLAY
PMODE PRESET PSET RESET SCREEN SET SOUND

6. Other/Special Commands
DATA DIM LLIST MOTOR POKE READ REM RESTORE RUN
TAB VERIFY DLD DST IBSHFT LREG PCOPY PMODD PTV
REAL SREG SWP VECTD VECTI

Compiled Program Speed (Time in minutes:seconds)

Program	Interpreter	MLBASIC
Eratosthenes Sieve	6:58.7	0:06.3
Matrix Fill,Mult,Sum 10x10	0:30.9	0:02.5
String Manipulation	6:22.5	2:17.7
Floating Point	0:32.6	0:30.6
Disk I/O (2000 PRINT/INPUTs)	2:21.5	0:27.6

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Two-Liner Contest Winner . . .

Here is a routine that plays a tune from a popular movie. The programming aspects of how to create repeated phrases are rather interesting. Enjoy this one and then tear it apart.

The listing:

```
1 A$="O3;L8;D;G;A;B;L4;A;L2;F+;L
8;D;G;A;B;L2.;A;L8;D;G;A;B;L4;A;
L2;F+;L8;F+;G;F+;D;L2.;D":B$="O4
;L8;D;C+;O3;L8;B;A;O4;L2.;C+;O3;
L2;B;L4;A;O4;L8;D;C+;O3;B;A;O4;L
2.;C+;L8;D;C+;O3;B;L4;A;O4;L2;C+
;O3;B;L4;A;L8;F+;G;F+;D;L2.;D"
2 PLAY A$:PLAYA$:PLAYB$:PLAYB$:P
LAY A$:PLAYA$:GOTO1
```

Paul Wigowsky
Woodburn, OR

(For this winning two-liner contest entry, the author has been sent copies of both *The Rainbow Book of Simulations* and its companion *The Rainbow Simulations Tape*.)

Homeware: A Home Management System

Tothian Software has released *Homeware*, a group of six programs (called modules) intended to help the CoCo user with various household chores. Each module is loaded and run separately. *Homeware* may be purchased as a set, or each module may be bought individually. Although sold on tape, all have provision for use with either tape or disk.

Of these programs, the *Director* module has the most desirable features. It is set up as a name, address and telephone number program, but can be used to keep track of birthdates or other information. In contrast to most programs of this kind, the information entered becomes a new data line in the program itself. After entering the names and addresses, the whole program is saved on a separate tape (or on disk). This is particularly useful for data not updated often and for the tape user tired of searching for the correct data tape.

The program has a search routine which functions rapidly to find any specified portion of the entries made. Names and addresses can be printed out in mailing label form and you can choose either all of the names or specify each one individually. The information can also be printed out across the page. Portions of the entry may be printed too. For example, just names and telephone numbers without the addresses.

The *Savings* and *Loans* modules, although separate programs, are sold together and provide information on interest calculations. The *Loans* module, in particular, is helpful. Enter the amount you can afford to pay each month and the number of years to pay back the loan. You are then provided with the amount the loan can be.

The *INVEN* module is a simple database program to keep track of various items. It writes the data entered to tape or disk. But the instructions provided do not give enough information to permit proper use. If the data is entered with one category being the number of items and another category the value of that item, a printed list of total value can be obtained. Nowhere in the program or documentation was this indicated.

The *Calendar* module prints, either on the screen or to a printer, a calendar for the month and year you request. If the printer has an elongation mode, you can enter very brief notes for the applicable dates. When the calendar is printed, these notes are listed numerically under the calendar page for that month. Notes entered cannot be saved for later retrieval.

The word processor module, *Homwrite*, is rather primitive. It has both typewriter mode and insert modes. Individual letters may be deleted by using the BREAK key. There is no word wrap, so words break at the end of each 32-character line. The end of a paragraph is signaled by typing ENTER and a colored block appears in the text at that point, but the cursor does not move to a new line. Tabs may also be set or text centered, both of which are indicated on the screen, but the cursor does not move over the specified number of spaces. A routine allows rapid forward and backward scrolling through 15 lines of text, but there is no repeat key function to allow rapid cursor movement through the text.

Prior to printout, a menu allows changes in margins, line length and page length. In contrast to the screen display, the text is printed so that no word is split at the end of a line. The printout is single spaced, although extra spaces may be added after each paragraph.

To summarize, the *Director* module is very useful for people with a tape system who wish to maintain a name and address file without having to search for a separate data tape. The *Savings* and *Loan* modules also work well. The calendar is perhaps less than what most people would expect from a computerized calendar program and the inventory program suffers from somewhat inadequate instructions. The final program, *Homwrite*, is not on a par with the other modules. It lacks so many common features that I hesitate to call it useful.

(Tothian Software, Inc, P.O. Box 663, Rimersburg, PA 16248, 16K ECB, set $49.95, individual modules $19.95)

— Carol Kueppers

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Software Review

XWord, XSpell and *XMerge* are Xtra Good

by Larry Goldwasser

XWord, XSpell, XMerge is a complete word processing system for OS-9 users. The X series consists of four free-standing programs for use under the OS-9 operating system on the Color Computer.

The first program is *XWord*. It contains both *XEd*, a text editor, and *XPrint*, a text formatter and printer driver. The major advantage to having these programs separate is the ability to use *XEd* to process OS-9 procedure files. I have never liked the editor supplied with OS-9 and I believe that others will want to use *XEd* too.

XEd must be installed in the current execution directory via the copy command. If you use only one drive (always a problem with OS-9) you must first load Copy and then proceed with a single drive copy.

In addition to *XEd*, a screen driver must be installed. The screen drivers supplied are *XCodes*, the normal CoCo screen, .OPAK for *O-PAK*, .XS for *XScreen*, and .XP for *Wordpak*. All of the drivers automatically adjust for the screen size you are using.

To start using *XEd*, type `XED` followed by either the filename you want to edit or the OS-9 memory option. At startup there is approximately 4½ K. You are greeted by a blank screen with a status line on top. The status line gives tabs, overwrite or insert mode, wordwrap status and cursor position.

With *XEd*, carriage returns are visible allowing the user to see where lines will end. *XEd* uses the CLEAR key as a control key and commands are entered as some variation of the control key plus at least one other key. The arrow keys are used to move the cursor non-destructively around the document.

The authors chose to stay with the OS-9 standard Clear A for insertion and Clear D for deletion instead of remapping the keyboard. For regular OS-9 users this should cause no problems. Most of the commands are accessible through the Clear C command mode entry. Command mode commands are: ?, H, T, B, F, R, V, A, X, U, K, O, D, I, W, Q, Z, P, S, C, M, L, N, G and E. Obviously, there is not room in a review to cover all these, but I will try to cover the most important ones.

Command		**Function**
?	—	list available command mode commands
H	—	list edit mode commands and explanations
T	—	move cursor to top of text (in buffer only)
B	—	move cursor to bottom of text (in buffer only)
F	—	find a string
R	—	find and replace a string with another string
V	—	find and verify a string before replacing it
A	—	find and replace a string again
X	—	set tab
U	—	unset tab
K	—	kill all tabs
O	—	execute an OS-9 command and return
I	—	toggles overwrite mode on and off
W	—	toggles wordwrap mode on and off
Q	—	quit editing
Z	—	abort editing (does not save work)
P	—	quit editing and print
M	—	get more text to edit (from file)
G	—	get file (file insertion)
E	—	define user programable keys ('K', 'N', 'O' and 'U')

This is not a complete list of the available commands but rather the ones I used the most. There is a whole set of block commands which I have ignored but are very useful. One note I should make is that the Q command automatically saves current work.

XPrint is the text formatter and printer driver supplied with the *XWord* system. It consists of three files: XP, Index and INIT.?. The question mark stands for the abbreviation of your printer. *XPrint* includes several printer drivers as well as the information necessary to change one of these to your printer.

When you have finished modifying the file, it must be copied into the execution directory as INIT.XP and the attribute of this file must be changed to allow it to be executable. This is done by typing `ATTR /d0/cmds/INIT.XP E`.

If you use more than one printer, you have the option of calling the init file wanted on the *XPrint* command line. You cannot do this if you call *XPrint* from *XEd* with the Clear C P command.

Most of the commands *XPrint* uses are entered on a format line. A format line starts with a period and calls the formatting options overriding the format options specified in the init file. These format options can be included in the

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command line or they can be in the text file itself (preceded by a period which must be the first character in the line).

This may seem a little complicated, but that's the price for the ability to change virtually any formatting option. These options include:

Margin (may be different for odd or even number pages)
TM — top
BM — bottom
LM — left
RM — right
PL — page length (must be the same for even and odd pages)

Line Format (may be different for odd or even pages)
L — left justified
C — centered
R — flush right
J — justified (except those ending in carriage returns)
A — all lines justified
LS — line spacing
PG — end page and force new page
OP — force end page and start at top of next odd page
EP — force end page and start at top of next even page
PP — page pause after printing
SP — force specified number of blank lines to be printed
NL — force specified number of lines to be printed in a block
FI — include file specified in printing

The list of available options is quite lengthy and if there are any omissions, I couldn't find them. Both header and footer insertions are supported and the page number may be included in either. Page numbers may be in either Arabic or Roman numerals. Tabbing is fully supported and this option includes the headers and footers.

Printer commands include font changes, print quality changes, underline, double strike, size of characters and spaces, width changes, superscript and subscript, italics and so forth.

If something needs to be changed in the printing of the text you may imbed a special instruction within a back-slash (\) character. This printer code is not limited to the printer presets specified in the init file, but may be any special printer code chosen by using `\z(printer code)\`.

XPrint also uses the program module *Index* to store, in a file, words and the current page number the user wants to save for later printing as an index page. This file prints three inches wide allowing two columns per page. There are many options which I have omitted.

All the options mentioned worked well and exactly as described. I had to make extensive changes to the closest init file to my printer. I did this without difficulty by consulting the printer code summary from the printer users manual.

The documentation supplied with *XWord* is excellent. The printing and binding make the documentation easy to use. The index and table of contents simplify looking up a specific topic. In short, the seventy-five pages give the user all the information needed. I felt the section on *XEd* was easier to use than the section on *XPrint*.

At first I was puzzled about where to use the format lines in *XPrint*. The examples given helped me to use the program, but still left me with questions. I had to do some experimentation to find out how some sections really worked.

The major complaint I have is not really a program fault. I do not have *O-PAK*, *XScreen*, or *Wordpak 80*. This forced me to use the *XCodes* 31-character screen. The cursor is very busy in *XEd* and if you watch the screen it is annoying. One thing which would make the program easier to use is a repeat key, at least for cursor movement.

In summary, this is a very effective and complete word processing system. I would recommend *XWord* to anyone who uses OS-9 on the Color Computer.

The third program I reviewed is *XSpell*, a spelling checker for text files. It can also detect obvious typographical errors which would result in nonsense words. *XSpell* is called from the execution directory. The user may switch disks if necessary to get the file to be checked in the drive.

The program then prompts for the name of the file to be checked. Give the name of the file including any pathnames necessary. *XSpell* opens the file and asks whether you want to consider as a word any group of characters enclosed by spaces or carriage returns (A) or only consider reasonable words (S). Using the 'S' selection eliminates any word or group with numbers, etc.

Generally, the user would choose selection 'A'. *XSpell* reads the entire file and constructs a list of all the words in the document. After digesting the file, the program asks for the name of the dictionary to use. This dictionary can be DICT (20,000 words), or DICT40 (40,000 words), the two dictionaries supplied with the program, or it could be a dictionary of your own creation.

After the dictionary file is opened, the program asks if

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you intend to update the dictionary with any new words it encounters. You also are given the option of starting a dictionary file with new words. These options are important if you plan to use the speller with technical reports or legal forms. Each time the program encounters a new word it requests a disposition on the word. The choices are: D, add all words to the dictionary; A, add this word to the dictionary; I, ignore this word and go to the next; M, mark this word as being incorrect; X, mark all words as incorrect; and Q, quit and return to DOS. Options A and D are not valid if you have previously selected not to add words to the dictionary.

After all unknown words have been processed, *XSpell* asks if you want to write a new text file. If yes, the program asks whether corrected or marked. Selecting Marked causes the entire text file to be rewritten with the questionable words marked by three asterisks trailing the word. If you select Correct, the text file is rewritten and as the program encounters each of the words you have selected as wrong, it prompts you to correct it. If the word was actually correct, you may choose to ignore the word and go on or mark the word to be looked at later.

One of the nicer features of *XSpell* is the ability to create its own dictionary. This can be created in one of two formats, either full format or compressed. The full format is simply a text file with words in it followed by a carriage return. The compressed mode offers the advantage of reduced disk space requirements and easier, quicker handling. Its main disadvantage is the relative difficulty for editing.

The obvious solution is to keep two dictionaries, one in full format and the other an exact copy except in compressed form. In either form the dictionary must be sorted in alphanumeric order making the easiest method of creating the program *XSpell* itself, which has a module designed to do this specific task.

When the user starts the program, he is asked if the new words are to be saved into a new dictionary or added to the old dictionary. This process creates a new dictionary or enlarges the current one. An *XSpell* dictionary may span several disks; the program prompts the user when to switch disks.

I found *XSpell* easy to use, but somewhat disappointing. Other spellers I have used offer the user the closest correct spellings it has on file. The user may select one of these spellings to be substituted or the user may correct the word from the keyboard. *XSpell* gives no such alternatives. The user must enter the correct spelling from the keyboard without benefit of the program's own dictionary. This forced me to have two dictionaries, one on disk and one in my hand.

One other problem I encountered with the *XSpell* program is its inability to distinguish imbedded control commands unless they are separated from the text by spaces. When I failed to use both leading and trailing spaces, the program presented these codes as words and prompted me for a disposition. Neither of these problems was very serious, but both were annoying.

XMerge is an upgrade to the *XPrint* module included in the *XWord* package. *XMerge* supports all of the formatting and printing commands available with *XPrint* and adds a few new ones of its own. They include: RP, Repeat text file X number of times; MF, Merge file name; RV, Read variables; PV, Prompt for variables; and SV, Set variable equal to string.

XMerge, like *XPrint*, must first be copied into the current execution directory. The program is then called with any command line options desired. *XMerge*, through the use of its special merge commands, allows the user to take variables from one file and combine them with the text from another file as it is printed.

This is the mechanism by which those personalized computer generated letters are made. This is also the way a mailing list is merged into a form letter. *XMerge* makes this process very easy. The user simply makes a form letter as a text file and includes, within square brackets, a variable name such as Name. The user must also make a merge file with a list of names. When *XMerge* encounters the bracketed variable, it looks at the merge file and selects the first name and inserts it. On the next form letter it takes the next name and so on. The user may have many such variables and the merged variable may be any combination of letters, numbers, or symbols up to eighty characters. All must be on one line, ended by a carriage return. The variable must be declared in a format line and the merge file must have been opened by the MF= command.

XMerge also allows the user to stop at each variable and prompt for keyboard input to be inserted in the text file. This is the .PV option. Something to remember: All files to be handled must be in ASCII.

The documentation for *XMerge* is complete and easy to understand. The examples given by the authors are clear and make the program much easier to use and understand.

As a general summary, the X series is a fine program group. If it has one weak link, it is *XSpell* which is not as full-featured as the other modules. I would rate *XSpell* as good and the other modules as excellent. If you use OS-9 on the Color Computer, you could not make a finer purchase than *XWord, XSpell, XMerge*. I recommend it highly.

(Microtech Consultants Inc., 1906 Jerrold Ave., St. Paul, MN 55112, *XWord* $69.95, *XSpell* $39.95, *XMerge* $24.95, all three $114.95, plus $3 S/H)

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July 1984 (Third Anniversary Issue) — *American Patrol*, a graphics and musical salute to Independence Day; *Landlord*, a Simulation of the popular board game, Monopoly; *Cooking With CoCo*, the first in a series of programs to enhance disk operating systems; *Anniversary Special: Arconiax Assignment*, the first-ever scratch-and-sniff Adventure; *Slash*, a printer utility to help in distinguishing zeros from the letter 'O'; *Bats and Bugs*, an arcade-type thriller; *Reverse*, a game of logic; *Cassette Label*, prints customized labels for musical tapes; *Orbital Motion*, the first in a series on creating Simulations; plus six more programs.

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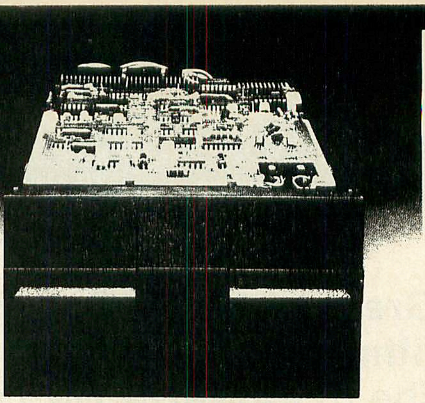

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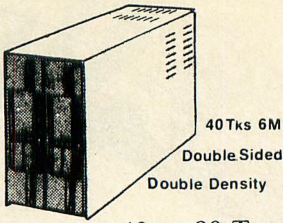

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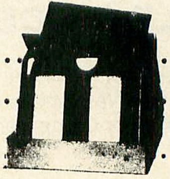

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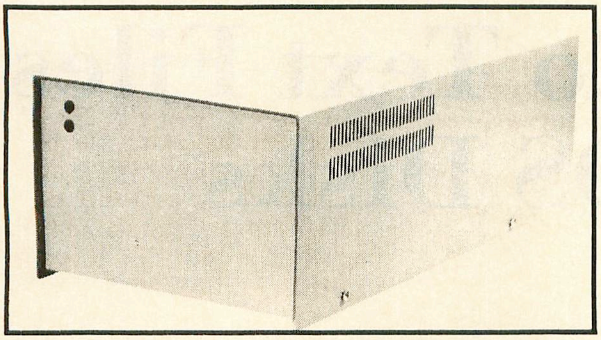

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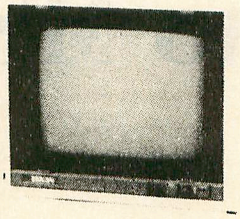

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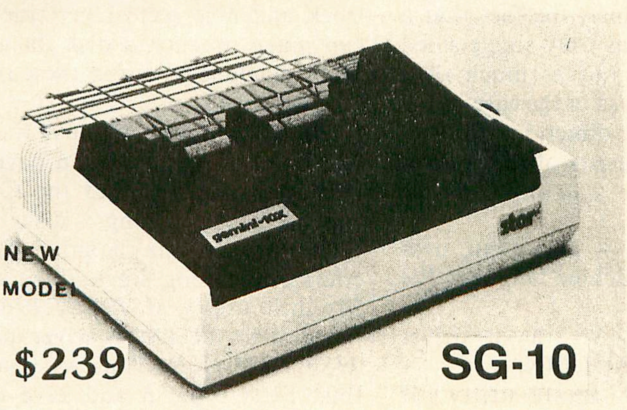

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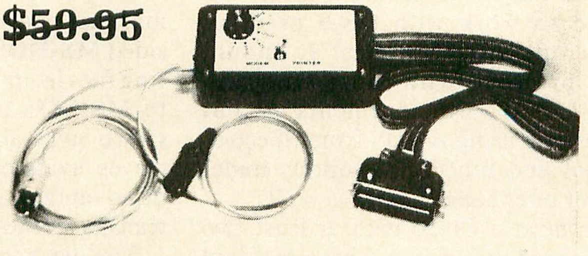

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Transfer CoCo Text Files to MS-DOS Disks

By Marty Goodman

In the last installment of this series I discussed transferring text files from a single-sided MS-DOS disk to the CoCo. In this month's article, I will discuss formatting a disk (using the CoCo) as a single-sided MS-DOS disk and transferring text files from the CoCo to that MS-DOS disk.

This converter is designed to work with Disk Extended BASIC versions 1.0 and 1.1 only. The program is not intended to work with OS-9 or other CoCo operating systems. It should work properly with most Disk Extended BASIC Enhancements. It has been tested using ADOS from Spectrosystems and functions properly under that set of enhancements.

You need a CoCo with at least two single-sided disk drives. I have required the use of two 40-track capable disk drives because with one drive the conversion would be unacceptably slow. There is no support provided for single-drive systems or double-sided drives. Old gray CoCo drives from Tandy probably won't work with this program because most of them can access only 35 tracks. Almost all disk drives sold in the last two years by Tandy and by third party sources are 40-track capable and should work fine.

Martin H. Goodman, M.D., a physician trained in anesthesiology, is a longtime electronics tinkerer and outspoken commentator — sort of the Howard Cosell of the CoCo world. Marty is the database manager of RAINBOW's CoCo Sig on Delphi. His noncomputer passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.

Note that this program package is more useful than the one I presented before, in the sense that any MS-DOS machine can read files from a single-sided MS-DOS disk. So, when transferring files from CoCo Disk BASIC format to MS-DOS machines, the fact that a CoCo (typically) has only single-sided drives available is not as much of a disadvantage as it was in the case of file transfer in the other direction.

This package consists of the following programs:

MS19GEN.BAS — This BASIC program creates the machine language file *MS19SET.BIN*.

MSFORMAT.BAS — BASIC driver program for MS19SET.BIN.

ADDLF.BAS — BASIC utilty for adding line feeds to CoCo text files. This will be needed in most cases to condition CoCo files prior to transferring them.

COCO2MS.BAS — main CoCo to MS-DOS converter

All of these programs are presented in this article, are available on RAINBOW ON TAPE, and are downloadable from the Delphi CoCo SIG from the RAINBOW ON TAPE area. Source code for *MS19SET.BIN* is posted in the free download area of Delphi's CoCo SIG under the filename MS19SET.SRC.

Formatting

To transfer CoCo files to a disk that will be read by an IBM PC or other MS-DOS machine, we must have a disk formatted in the way MS-DOS expects: 40 tracks, nine 512-byte-long sectors per track and nine sectors per track. One can make up such a disk on an MS-DOS machine by using the command `FORMAT B: /1`.

What if you want to move files to an MS-DOS disk and all you have is the CoCo? It happens that the CoCo is capable of formatting a disk in MS-DOS fashion (single-sided only, of course, assuming single-sided drives). My little utility *MS19SET.BIN*, combined with the BASIC driver program *MSFORMAT.BAS* allows you to do this. First type in and save to disk *MS19GEN.BAS*. Then run the program. It creates and saves to disk the needed machine language program *MS19SET.BIN*.

After creating the program *MS19SET*, be sure to have it on the same disk with *MSFORMAT.BAS*. Now run *MSFORMAT.BAS*. You are instructed to put a blank, unformatted disk into Drive 1 and press ENTER. The disk will be formatted in MS-DOS fashion. Some minimal amounts of specific data entered into key sectors in the FAT (File Allocation Table) and Directory sectors will make the disk a proper blank MS-DOS type disk. Never simply `LOADM` and `EXEC MS19SET.BIN`. If you do, it will attempt to format the disk in Drive 0.

Technical Tip

There is an idiosyncrasy in the NEC disk controller chip used on virtually all IBM PCs and clones. Unlike the Western Digital disk controller chip used in the CoCo and Model IV, the NEC chip performs an automatic hardware reset when it sees the index sector hole. So when programming a Western Digitial chip to format a disk to be read by an NEC controller chip, you should be careful to make the initial gap between the index sector hole and the first sector header somewhat bigger than you would if writing a format track for the Western Digital chip itself. If you don't, the machine trying to read the disk with the NEC chip may sometimes fail to see the first sector on a given track because the NEC chip is still recovering from its automatic reset.

Full source code (in Macro 80C format) for *MS19SET.BIN* is available in the free download section of the Delphi CoCo SIG, in the assembly language topic area. Feel free to examine it and compare how I did the format routine there to how Microsoft did the format code for the Color Computer's `DSKINI` command. A complete disassembly of the Disk BASIC `DSKINI` command can be found in *Spectral Associates Disk Basic Decoded*, available from both Spectral Associates and from Spectrum Projects.

Note also that if you are trying to read an ordinary CoCo format disk on an IBM PC or other MS-DOS machine with an NEC controller chip and are having problems getting the IBM PC to read the first sector on the disk, try putting a piece of tape over the index sector hole on the disk. The index sector hole is not used in ordinary sector reads, so covering it will not hurt the ability of the controller to read the disk.

The Line Feed Problem

Although my converter program faithfully transfers every byte in a text (or other) CoCo file to an MS-DOS format disk in proper MS-DOS file format, this is not sufficient for practical file transfer of ASCII text. In the last installment we saw how MS-DOS type files come with Line Feed control characters (LFs) after each Carriage Return control character (CR). There we had to use a special program after conversion to strip out the line feeds so as not to confuse the CoCo word processors that not only don't use the line feeds, but also choke on them when encountered in a file.

For conversion in the reverse direction, we must (in nearly all cases) add an LF character to the CoCo Text File after each Carriage Return in the text. If we fail to do this, the converted file is unreadable to most MS-DOS based word processors. So, before moving a CoCo text file to an MS-DOS disk, convert it to a file with added LFs using *ADDLF.BAS*. This program is a clever hybrid of BASIC Disk I/O and ML file conditioning written by Art Flexser and enhanced by Don Hutchison. Both of these folks can be found on the Delphi SIG (user names ARTFLEXSER and DONHUTCHISON). It is included in this article by the kind permission of its author.

Simply run *ADDLF.BAS*. It prompts for the filename of the file to be conditioned and then for the filename of the conditioned file that will be written. Then it adds LFs after each CR it finds, and rewrites the file to the new filename specified.

File Conversion

You are finally ready to use *COCO2MS.BAS*, the main file converter program. This program is written in BASIC and is commented. The program is essentially self-prompting and menu driven. Simply `LOAD` and run the program. Put a CoCo Disk BASIC type disk in Drive 0 and a single-sided MS-DOS format disk in Drive 1. Press ENTER and the program confirms that a proper type MS-DOS disk is indeed in Drive 1. It reads the directory of the CoCo disk in Drive 0, and puts the directory entries on the screen as a menu for you to select the filename you want to convert. Note that a completely full CoCo disk can have up to 68 separate files on it, so if there are more files, the program reminds you there are more to be seen if you press the appropriate arrow keys.

A note here on user interface design: This arrangement of file selection is inferior to a true point and pick selection routine, where all filenames are scrolled past a pointer and you press the firebutton or ENTER key to select a file. But it is far superior to blindly typing in a filename and being expected to get the spelling and syntax precisely right.

Select a file by pressing the letter associated with the filename. The screen clears and you are asked to confirm the choice. Press ENTER again and file conversion begins. The time needed depends on the size of the file, but goes fairly rapidly (roughly 2400 Baud). During conversion, the screen displays the number of bytes still to be converted. After the conversion is completed, you are asked for a filename to be assigned to the file as it exists on the MS-DOS disk. You can then exit the program or restart it.

Note that all files converted to the MS-DOS disk will be written to the root directory. This program is incapable of creating or writing to subdirectories on the MS-DOS disk. The program also adds some trash to the end of a file after converting it. Usually this trash is from the file itself. So don't be alarmed if at first glance you see what appears to be a file with a few of its last lines cut off. Most likely, if you look back you will see the true end of the file. This minor flaw is due to my lazy decision to write MS-DOS files in even 512-byte-sector size increments.

Man's Best Friend?

By Marty Goodman

For the last four years I've been doing nearly all of my day-to-day computing on a heavily repackaged Radio Shack 'D' board Color Computer. This unit is powered by a linear power supply I designed and built. When the unit was first built, the power supply showed some problems whenever the disk drives were accessed. Black bars appeared on the screen during such access. I traced this problem to bad head room on the input to my 12-volt regulators. I added an autotransformer to boost the incoming voltage to greater than 120 VAC. This cured the problem for the next four years.

About a week ago the problem returned. More and more during disk access, the screen was darkened by slow moving black bars. The problem got worse over the next few days. Eventually the bars sometimes appeared even

Hacker Tips

Hackers will note that I have successfully used the *MS2 COCO* program (*presented in* the previous installment of this series) to transfer CoCo machine language programs and CoCo tokenized BASIC programs I downloaded from Delphi over to my CoCo Disk BASIC disks using my IBM PC clone. I deleted statement 5050 from *MS2COCO* to insure a pure byte for byte transfer, then transferred the files to the CoCo Disk. I loaded the .TXT files created into *MIKEYTERM 4.0* and saved them as binary ML program or Compressed (tokenized) BASIC, whichever was appropriate to the given file. With compressed BASIC programs, I'd often get a DS Error when loading a file, but the file *had* loaded fully and properly. Saving the result back to disk cleaned up the file so that I had a working tokenized BASIC file.

If you do not have *Mikeyterm*, condition the file by using a disk zapper program to edit the two flag bytes in the directory entry that tell Disk BASIC what kind of file it is going to deal with. *Mikeyterm* is available in the free download section of Delphi's CoCo SIG Data Communications database. It is the terminal program I use when I am telecommunicating with my CoCo.

Acknowledgments

I'd like to thank Fred Cisin, author of *Xenocopy* for MS-DOS computers, for his endless patience in teaching me what I needed to know of MS-DOS file structure. And Don Hutchison and Cray Augsburg (RAINBOWMAG on Delphi) for beta testing this material. Art Flexser deserves special mention for his kindness in donating his *ADDLF* program to this package.

Other Fine Products

I'd like to remind readers who need to do file transfers between the CoCo and other machines of the three other commercial programs mentioned in the previous installment of this series.

Mark Data Products makes a program called *CoCo Util* that converts to and from Disk BASIC on an MS-DOS type machine. Note that this is an MS-DOS program and runs only on MS-DOS machines. It is available from Mark Data Products, 24001 Alicia Parkway, No. 207, Mission Viejo, CA 92691, (714) 768-1551.

D.P. Johnson makes conversion utilities to handle file conversions betwen OS-9 disks and MS-DOS disks. These utilities run on the Color Computer under OS-9, and support double-sided disk drives. D.P. Johnson, 7655 S.W. Cedarcrest St., Portland, OR 97223, (503) 244-8152.

For those with an IBM PC or other MS-DOS machine who want the ultimate in file conversion utilties, let me recommend *Xenocopy II*. This program runs on nearly all MS-DOS machines and will read from, write to and format over 250 different disk formats. This includes OS-9, Color Computer and hundreds of CPM varient formats. If you obtain special hardware, this conversion program also supports a number of 8-inch and 3½-inch disk formats. *Xenocopy II* is available from Xensoft, 1454 6th Street, Berkeley, CA 94710, (415) 525-3113. ☐

when the disk drives were not spinning. The screen would occasionally flicker, too. I measured the AC line voltage from the outlet the computer was plugged into and found it a little on the low side. It measured between 106 and 118 volts. No other appliance in my house seemed affected, though I occasionally noticed the lights flickering, too.

As a quick fix, I hooked up a variac to my computer's AC input and boosted the incoming voltage by about five percent. This completely cured the problem of the black bars. I called the power company and told them the power they were supplying was down by a few percent and it was affecting my computer. I wanted to know if they were going to be standardizing around a new and lower power for my area, so that I could redesign my computer's power supply accordingly. They sent out a service person.

He arrived the next day and quickly determined the power in the computer's outlet *was* down by five to 10 percent. He measured the incoming power to the house and found it to be normal. He decided to check the secondary breaker box in my basement.

When he removed the front panel, we were confronted with a sizzling noise and the sight of a bright yellow arc around one of the main 220 volt lead-in wires. The wire and the main bus bar were just under red hot. I learned that 20 years ago when the house was wired, the contractor had used aluminum wiring for the main 220 volt line. Aluminum wiring has a long history of causing houses to burn down (with several associated fatalities) due to its tendency to get loose in its contacts, oxidize, develop resistance and begin to arc.

The scientific explanation is quite clear: My poor design of the linear power supply for the CoCo had caused it to be overly sensitive to lowered incoming AC voltage. An idiosyncrasy in the CoCo 1's video circuitry caused a slight decrease in the 12-volt line and resulted in the appearance of black bars on the screen. My CoCo is a mere machine — a box of silicon chips and copper wire. Yet, during the time I was fixing the 220 volt contact in the fuse box, it was hard for me not to believe my devoted CoCo had sent a warning to me that saved my life. ☐

Listing 1: `MS19GEN`

```
 5 GOTO 50000
 10 NAM$="MS19SET.BIN" 'FILENAME
 20 S=&H3000 'START ADR
 30 T=&H3242 'ENDADR
 40 B=&H3000 'EXEC ADR
 70 CLS:PRINT@256-32,"NOW CREATIN
G THE FILE"
 75 PRINT"I'LL COUNT BACKWARDS."
 80 PRINT"WHEN I HIT ZERO I'LL BE
  DONE."
90 X=0
100 CKSM=0
105 FOR C=0 TO 31
110 READ H$
120 IF H$="END" THEN GOTO 900
130 D=VAL("&H"+H$)
140 POKE S+X+C,D:CKSM=CKSM+D
145 BB=T-(X+S+C)
146 IF BB<0 THEN GOTO 150
147 PRINT@334,BB
150 NEXT C
160 READ DSUM
```

```
170 IF DSUM<>CKSM THEN GOTO 500
180 X=X+32:GOTO 100
500 K=INT(X/32)
510 CLS:SOUND 100,10
520 PRINT@256,"ERROR IN LINE ";1
000+K
530 END
900 CLS:PRINT"PUT A DISK IN DRIV
E 0"
910 PRINT"TAP ENTER TO SAVE"
920 PRINT"     ";NAM$
930 PRINT"TO YOUR DISK."
940 A$=INKEY$
950 IF A$<>CHR$(13) THEN GOTO 94
0
960 SAVEM NAM$,S,T,B
980 PRINT:PRINT:PRINT"       ALL D
ONE!"
990 END
1000 DATA BE,C0,6,6F,84,AD,9F,C0
,4,6D,6,10,26,1,90,17,1,9A,BE,C0
,6,7F,9,85,6F,2,86,C0,B7,FF,48,1
7, 3280
1001 DATA 1,5E,10,26,1,79,BE,C0,
6,20,1C,81,16,25,8,B6,9,86,8A,10
,B7,FF,40,86,53,B7,FF,48,1E,88,1
E,88, 2955
1002 DATA BD,31,80,10,26,1,58,A6
,2,17,1,1B,BD,31,78,10,8E,FF,4B,
1A,50,8E,30,79,BF,9,83,8E,40,0,B
6,FF, 2965
1003 DATA 48,86,FF,B7,9,82,C6,F4
,F7,FF,48,B6,9,86,8A,80,B7,FF,40
,E6,80,E7,A4,20,FA,BE,C0,6,B6,FF
,48,1C, 4852
1004 DATA AF,84,44,10,26,1,18,6C
,2,A6,2,B1,31,A7,10,25,FF,99,8E,
40,0,CC,FC,FF,ED,81,CC,FF,0,ED,8
1,CC, 3898
1005 DATA 0,0,ED,81,8C,42,0,25,F
9,BE,C0,6,86,3,A7,84,CC,40,0,ED,
4,CC,0,2,ED,2,AD,9F,C0,4,6D,6, 3
279
1006 DATA 10,26,0,DB,86,4,A7,3,A
D,9F,C0,4,6D,6,10,26,0,CD,CC,0,0
,FD,40,0,FD,40,2,FD,40,4,86,3, 2
781
1007 DATA A7,3,AD,9F,C0,4,6D,6,1
0,26,0,B3,86,5,A7,3,AD,9F,C0,4,6
D,6,10,26,0,A5,8E,40,0,CC,F6,F6,
 3119
1008 DATA ED,81,8C,42,0,25,F9,8E
,40,0,86,E5,A7,84,30,88,20,8C,42
,0,25,F6,BE,C0,6,86,3,A7,84,86,6
,A7, 3562
1009 DATA 3,AD,9F,C0,4,E6,6,10,2
6,0,74,6C,3,A6,3,81,A,25,EC,BE,C
0,6,CC,40,0,ED,4,86,2,A7,84,86,
3095
1010 DATA 0,A7,2,C6,1,E7,3,AD,9F
,C0,4,6D,6,10,26,0,4E,6C,3,E6,3,
C1,A,25,EC,6C,2,A6,2,81,28,25, 2
681
1011 DATA E0,7F,FF,40,F,F0,39,8E
,41,E,C6,A,5A,27,8,A7,84,30,89,2
,80,20,F5,39,8E,22,2E,30,1F,26,F
C,39, 3144
1012 DATA 10,8E,0,0,31,3F,27,8,B
6,FF,48,85,1,26,F5,39,86,D0,B7,F
F,48,1E,88,1E,88,B6,FF,48,86,80,
39,7F, 3439
1013 DATA FF,40,86,55,97,F0,39,2
8,7F,FF,40,39,8E,40,0,CE,32,B,10
,8E,0,5,8D,39,31,3F,10,8C,0,0,26
,F6, 2915
1014 DATA 4F,B7,32,42,86,1,B7,32
,41,CE,32,15,10,8E,0,12,8D,1F,31
,3F,10,8C,0,0,26,F6,B6,32,41,4C,
B7,32, 2594
1015 DATA 41,81,A,25,E4,CE,32,39
,8D,7,8D,5,8D,3,8D,1,39,EC,C1,C1
,BB,27,A,C1,CC,27,B,E7,80,4A,26,
FB, 3446
1016 DATA 39,F6,32,42,20,F5,F6,3
2,41,20,F0,96,4E,14,0,3,F6,1,FC,
50,4E,C,0,3,F5,1,FE,1,AA,1,BB,1,
 3112
1017 DATA CC,1,2,1,F7,16,4E,C,0,
3,F5,1,FB,80,FF,80,FF,80,FF,80,F
F,1,F7,44,4E,FF,4E,FF,4E,FF,4E,F
F, 4247
1018 DATA 4E,0,0,FF,FF,FF,FF,FF,
FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF
,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,F
F,FF,FF, 7473
1019 DATA END
50000 PCLEAR 1:GOTO 10
```

Listing 2: MSFORMAT

```
5 LOADM "MS19SET"
10 CLS:PRINT"PUT BLANK DISK IN D
RIVE 1"
20 PRINT"HIT ENTER WHEN READY"
30 IF INKEY$="" THEN GOTO30
50 POKE &HEB,1:EXEC
60 IF PEEK(&HF0)<>0 THEN GOTO 10
0
70 CLS:PRINT"YOUR DISK IS FORMAT
TED "
80 PRINT"AS AN MS DOS SINGLE SID
ED DISK"
90 GOTO110
```

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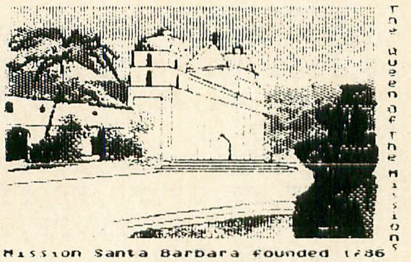

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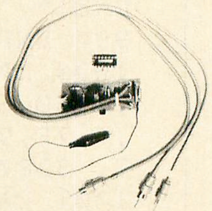
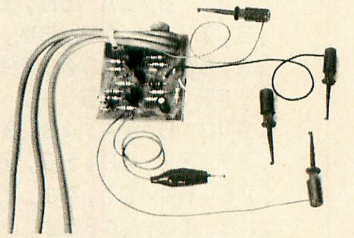


MONO II

Mono II for Color Computer 2. An excellent monochrome monitor driver that has audio output also. Specify model needed.

$24.95.

DOUBLE DRIVER II



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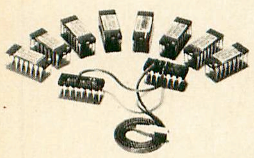

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```
100 CLS:PRINT"ERROR FORMATTING T
HE DIS"
110 PRINT"TAP ENTER TO RERUN PRO
GRAM"
120 A$=INKEY$
130 IF A$<>CHR$(13) THEN GOTO 12
0
140 GOTO 10
```

Listing 3: ADDLF

```
10 'LINEFEED ADDER
20 'ART FLEXSER, MARCH 1986
30 '
40 'MODIFIES ASCII FILES BY ADDI
NG A LINEFEED AFTER EACH
50 'CARRIAGE RETURN IF ONE IS NO
T ALREADY PRESENT.
60 '
70 CLEAR200,&H7E00
80 FORI=&H7E00 TO &H7E37:READ P$
:POKEI,VAL("&H"+P$):NEXT
90 DATA 8D,18,8D,2B,8D,1B,81,0D,
26,F6,8D,0E,81,0A,27,F4,34,02
100 DATA 86,0A,8D,0B,35,02,20,E8
,C6,01,D7,6F,7E,C5
110 DATA 97,C6,02,D7,6F,AD,9F,A0
,02,0F,6F,6E,9F,A0,02,0D,70,27
120 DATA 04,0F,6F,32,62,39
130 IF PEEK(&HC004)<>&HD6 THEN P
OKE&H7E20,&HC4
140 CLS:PRINT:PRINT:PRINTTAB(8)"
LINEFEED ADDER":PRINT
150 LINEINPUT"NAME OF INPUT FILE
: ";I$
160 LINEINPUT"NAME OF OUTPUT FIL
E: ";O$
170 OPEN "I",#1,I$
180 OPEN "O",#2,O$
190 EXEC&H7E00
200 CLOSE
210 END
```

210	30	17130	225
360	163	20020	250
525	129	25000	140
1120	78	25160	134
2120	172	30050	47
10010	162	40050	164
15050	9	END	179

Listing 4: COCO2MS

```
5 CLEAR 4000, &H5DFF
10 DIM NAM$(64):DIM SG(64)
20 H=PEEK(&HC004):L=PEEK(&HC005)
:DKON=H*256+L
30 CQ=0:MQ=1 'SET DRIVE # FOR CO
CO AND FOR MS DOS DISK
100 CLS:PRINT@32,"   COLOR COMPU
TER TO MSDOS"
105 PRINT"   FILE CONVERSION UTI
LITY"
110 PRINT:PRINT" (C) JAN 1986 MA
RTY GOODMAN"
115 PRINT:PRINT:PRINT"  PUT COCO
 DISK IN DRIVE 0"
120 PRINT:PRINT"  PUT MS DOS DIS
K IN DRIVE 1"
125 PRINT:PRINT"(MS DOS DISK MUS
T BE FORMATTED"
130 PRINT"AS ONE SIDED 9 SECTOR
PER TRACK)"
140 PRINT:PRINT"  *** TAP ENTER
TO PROCEED ***"
150 IF INKEY$<>CHR$(13) THEN GOT
O 150
200 REM READ IN COCO GAT AND MS
 DOS FAT, AND READ COCO DIRECTOR
Y
210 CLS:PRINT:PRINT"NOW SETTING
UP FOR FILE TRANSFER"
215 PRINT:PRINT"THIS WILL TAKE A
BOUT 10 SECONDS"
220 PRINT:PRINT:PRINT:PRINT"
     PLEASE WAIT"
230 POKE &HEA,2:POKE &HEB,CQ:POK
E &HEC,17:POKE &HED,2:POKE &HEE,
&H5F:POKE &HEF,0
235 EXEC DKON
240 IF PEEK(&HF0)<>0 GOTO 9100
250 FOR N=2 TO 3
255 POKE &HEB,MQ:POKE &HEC,0:POK
E &HED,N:POKE &HEE,&H72+(N-2)*2
257 EXEC DKON
260 IF PEEK(&HF0)<>0 THEN GOTO 9
000
265 NEXT N
270 GOSUB 30000
300 REM DISPLAY COCO DIRECTORY
AND SELECT A FILE TO CONVERT
310 PAGE=1
315 IF LE=0 GOTO 9200
320 REM LOOP
325 CLS
330 B=(PAGE-1)*22+1
335 F=B+21
340 IF LE<F THEN F=LE
350 J=0
355 PRINT@INT(J/2)*32,CHR$(J+65)
360 PRINT@INT(J/2)*32+2,NAM$(J+B
)

365 J=J+1:IF B+J>F GOTO 395
370 PRINT@INT(J/2)*32+16,CHR$(65
+J)
```

```
375 PRINT@INT(J/2)*32+18,NAM$(J+
B)
380 J=J+1:IF B+J>F GOTO 395
390 GOTO 355
395 GOSUB 10000
400 A$=INKEY$
402 IF A$=CHR$(32) THEN GOTO 100
405 IF A$="" GOTO 400
410 IF PAGE=2 THEN GOTO 475
415 IF PAGE=1 GOTO 450
420 IF A$=CHR$(10) THEN PAGE= 2:
GOTO 320
430 GOTO 500
450 IF LE<22 GOTO 500
455 IF A$=CHR$(94) THEN PAGE=2:G
OTO 320
460 GOTO 500
475 IF LE<44 THEN GOTO 480
477 IF A$=CHR$(94) THEN PAGE =3:
GOTO 320
480 IF A$=CHR$(10) THEN PAGE=1:G
OTO 320
500 A=ASC(A$)
510 A=A-65+B
515 IF A<0 THEN GOTO 400
520 IF A>F GOTO 400
525 CLS
530 PRINT@32,"YOU HAVE CHOSEN: "
535 PRINT:PRINT"         ";:PRINTNAM
$(A):PRINT
540 PRINT:PRINT"IF THIS IS CORRE
CT, TAP ENTER"
545 PRINT"IF NOT, TAP ANY OTHER
KEY"
550 A$=INKEY$
555 IF A$="" GOTO 550
560 IF A$<>CHR$(13) THEN GOTO 32
0
570 GOTO 1000
900 END
1000 REM MAIN FILE CONVERSION LO
OP
1005 CLS:PRINT@256," BYTES TRANS
FERRED: "
1010 FZ=0
1015 YY=0
1020 G=SG(A)
1025 ZQ=33
1030 REM LOOP
1035 EF=0
1040 GOSUB 40000
1045 U=9
1050 IF G<70 GOTO 1100
1060 U=G-100
1100 FOR J=1 TO U
1110 L=&H6000+(J-1)*512
1120 FZ=FZ+512
1121 PRINT@256+19,FZ
1122 IF G<68 GOTO 1130
1125 IF J=U THEN EF=255
1130 GOSUB 25000
1135 IF YY=0 THEN WW=OC
1137 IF YY=0 THEN YY=255
1140 IF CXN=&HAAA THEN GOTO 9300
1150 NEXT J
```

About The One-Liner Contest . . .

THE RAINBOW's One-Liner Contest has now been expanded to include programs of either one or two lines. This means a new dimension and new opportunity for those who have "really neat" programs that simply just won't fit in one line.

Here are the guidelines: The program must work in Extended BASIC, have only one or two line numbers and be entirely self-contained — no loading other programs, no calling ROM routines, no poked-in machine language code. The program has to run when typed in directly (since that's how our readers will use it). Make sure your line, or lines, aren't packed so tightly that the program won't list completely. Finally, any instructions needed should be *very* short.

Send your entry (preferably on cassette) to:

THE RAINBOW One-Liner Contest
P.O. Box 385
Prospect, KY 40059

Two-Liner Contest Winner . . .

This little program will be familiar to many of you. It emulates the etch-a-sketch idea. Just use your joystick to draw. When you are tired of one picture and want to start over, press the firebutton (it sure beats shaking your computer upside-down).

The listing:

```
10 A=L:B=U:PMODE4,1:PCLS:SCREEN1
,1
20 U=(JOYSTK(1)*3):L=(JOYSTK(0)*
4):K=PEEK(65280):PSET(L,U):LINE(
A,B)-(L,U),PSET:IFK=126ORK=254TH
EN10ELSEA=L:B=U:GOTO20
```

Stan Hiatt
Atlantic Beach, FL

(For this winning two-liner contest entry, the author has been sent copies of both *The Rainbow Book of Simulations* and its companion *The Rainbow Simulations Tape.*)

```
1160 IF EF=255 THEN GOTO 2000
1170 GOTO 1030
2000 CLS
2010 PRINT@32,"TYPE IN A FILE NA
ME FOR THE"
2020 PRINT"FILE ON THE MS DOS DI
SK"
2030 PRINT"USE UP TO 8 LETTERS"
2040 PRINT:INPUT A$
2050 IF LEN(A$)=0 THEN GOTO 2010
2060 B=LEN(A$)
2065 IF B=0 THEN GOTO 2000
2070 IF B>8 THEN GOTO 2000
2075 IF B=8 GOTO 2095
2080 A$=A$+STRING$(8-B," ")
2095 A$=A$+"COL"
2100 REM WRITE DIR ENTRY  TO MS
DOS DISK
2105 GOSUB 20000
2110 IF A$="" THEN GOTO 9300
2120 POKE &HEA,3:POKE &HEB,MQ
2130 REM WRITE TWO COPIES OF UPD
ATED FAT TO MS DOS DISK
2140 FOR N=2 TO 5
2145 LO=&H72+(N-2*INT(N/2))*2
2150 POKE &HED,N:POKE &HEE,LO
2160 EXEC DKON
2170 NEXT N
2180 GOTO 300
9000 CLS:PRINT"BAD MS DOS DISK":
END
9100 CLS:PRINT"BAD COCO DISK":EN
D
9200 CLS:PRINT" COCO DISK IS BLA
NK"
9210 PRINT" PUT ANOTHER ONE IN D
RIVE 0"
9220 PRINT" AND TAP ENTER"
9230 IF INKEY$<>CHR$(13) THEN GO
TO 9230
9240 GOTO 100
9300 CLS:PRINT"MS DOS DISK IS FU
LL"
9310 PRINT"PUT ANOTHER MS DOS DI
SK IN"
9320 PRINT"DRIVE 1 AND TAP ENTER
"
9330 IF INKEY="" THEN GOTO 9330
9340 GOTO 100
10000 PRINT@12*32,"SELECT FILE B
Y TAPING A LETTER"
10010 IF LE<22 THEN GOTO 10050

10020 IF PAGE=2 THEN GOTO 10100
10030 IF PAGE=3 THEN GOTO 10200
10040 PRINT"TAP UP ARROW TO SEE
```

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```
MORE ENTRIES";
10050 PRINT"TAP SPACE BAR TO RES
TART PGM";
10060 RETURN
10100 IF LE>44 GOTO 10150
10110 PRINT"TAP DN ARROW TO SEE
PREV ENTRIES";
10120 GOTO 10050
10150 PRINT"TAP UP ARROW TO SEE
MORE ENTRIES";
10160 PRINT"TAP DN ARROW TO SEE
PREV ENTRIES";
10170 GOTO 10050
10200 PRINT"TAP DN ARROW TO SEE
PREV ENTRIES";
10210 GOTO 10050
15000 REM READ FAT
15001 REM GN =CLUSTER ENTRY#
15002 REM GN=0 TO 440
15003 REM CV = CONTENTS OF THE
CLUSTER NUMBER REQUESTED
15005 FB=&H7200
15010 GIN=INT(GN/2)
15020 GCN=3*GIN
15030 GF=GN-2*GIN
15040 B1=PEEK(FB+GCN)
15050 B2=PEEK(FB+GCN+1)
15055 B3=PEEK(FB+GCN+2)
15060 N1=(B1 AND &HF0)/16
15070 N3=(B2 AND &HF0)/16
15080 N5=(B3 AND &HF0)/16
15090 N2=B1 AND &HF
15100 N4=B2 AND &HF
15110 N6=B3 AND &HF
15120 IF GF=0 GOTO 15200
15150 CV=N3+N6*16+N5*256:RETURN
15200 CV=N2+N1*16+N4*256:RETURN
17000 REM WRITE A CLUSTER VALUE
 INTO A GIVEN CLUSTER NUMBER
17001 REM GN=CLUSTER NUMBER, CV
IS THE 12 BIT VALUE TO BE PUT TH
ERE
17003 REM THIS IS ALL DONE TO FA
T BUFFER AREA.
17010 N1=INT(CV/256):T=CV-256*N1
17020 N2=INT (T/16)
17030 N3=T-16*N2
17050 GIN=INT(GN/2)
17060 GCN=3*GIN
17070 GF=GN-2*GIN
17075 GOSUB 17300
17080 IF GF=0 GOTO 17200
17100 REM WRITE TO ODD CLUSTER E
NTRY NUMBER
17110 B2=B2 AND &HF:B2=B2+16*N3
17120 B3=16*N1+N2
17130 POKE &H7200+GCN+1,B2
17140 POKE &H7200+GCN+2,B3
17150 RETURN
17200 REM WRITE TO EVEN CLUSTER
ENTRY NUMBER
17210 B1=16*N2+N3
17220 B2=B2 AND &HF0:B2=B2+N1
17230 POKE &H7200+GCN,B1
17240 POKE &H7200+GCN+1,B2
17250 RETURN
17300 B1=PEEK(&H7200+GCN)
17310 B2=PEEK(&H7200+GCN+1)
17320 B3=PEEK(&H7200+GCN+2)
17340 RETURN
20000 REM FIND FREE MSDOS DIR EN
TRY
20001 REM WRITE A$ INTO THAT ENT
RY, WITH ATTRIBUTE BYTE SET TO 2
20002 REM LEAVE FILE SIZE BLANK
20003 REM THIS IS EQUIV OF AN
'OPEN' STATEMENT
20004 REM IF A$="" ON RETURN THE
 DIR SPACE IS FULL
20005 REM A$ IS A STRING 11 BYTE
S LONG
20006 REM WITH FILE NAME AND EXT
ENTION
20007 REM WW=# OF FIRST CLUSTER
ENTRY
20010 A$=A$+CHR$(&H20)+STRING$(1
4,CHR$(0))
20020 X=WW:GOSUB 45000
20030 G1$=CHR$(L):G2$=CHR$(H)
20035 GOSUB 46000
20040 A$=A$+G1$+G2$+CHR$(D1)+CHR
$(D2)+CHR$(D3)+CHR$(0)
20045 GOSUB 20100
20050 IF A$="" THEN RETURN
20060 FOR Q=0 TO 31
20062 POKE MDB+K*32+Q,ASC(MID$(A
$,Q+1,1))
20064 NEXT Q
20070 POKE &HEA,3:POKE &HEB,MQ
20075 EXEC DKON
20080 RETURN
20100 FOR N=0 TO 3
20110 MDB=&H7600:MSB=&H76
20120 POKE &HEA,2:POKE &HEB,MQ:P
OKE &HEC,0:POKE &HED,6+N:POKE &H
EE,MSB:POKE &HEF,0
20130 EXEC DKON
20135 IF PEEK(&HF0)<>0 THEN GOTO
 9100
20140 FOR K=0 TO 15
20150 FB=PEEK(MDB+32*K)
20160 IF FB=&HE5 THEN RETURN
20170 IF FB=0 THEN RETURN
20180 NEXT K
20190 NEXT N
20195 A$="":RETURN
25000 REM FIND FREE CLUSTER
25001 REM WRITE SECTOR AT LOC L
```

```
     TO THAT CLUSTER
25002 REM FIND NEXT FREE SECTOR
25003 REM UPDATE FAT
25004 REM RETURN WITH NEXT FREE
CLUSTER
25005 REM CXN=ENTRY # OF NEXT FR
EE CLUSTER
25006 REM IF NO MORE FREE CLUSTE
RS CXN SET = &HAAA
25007 REM IF EF=255 THEN DON'T B
OTHER TO FIND NEXT CLUSTER
25008 REM AND WRITE END CLUSTER
FLAD INTO FAT
25010 Q=INT(L/256):QL=L-256*Q
25040 IF ZQ=33 THEN CXN=2:ZQ=0
25050 FOR GN=CXN TO 352
25060 GOSUB 15000
25070 IF CV=0 GOTO 25100
25075 IF CV=&HFF7 GOTO 25100
25080 NEXT GN
25090 CXN=&HAAA:RETURN
25100 REM FIND NEXT FREE GRAN
25105 OC=GN
25110 IF EF=255 THEN GOTO 25200
25120 FOR GN=OC+1 TO 352
25130 GOSUB 15000
25140 IF CV=0 THEN GOTO 25200
25150 IF CV=&HFF7 THEN GOTO 2520
0
25160 NEXT GN
25170 CXN=&HAAA:RETURN
25200 CXN=GN
25210 GN=OC:CV=CXN
25215 IF EF=255 THEN CV=&HFFF
25220 GOSUB 17000 'WRITE GAT ENT
RY TO BUFFER
25230 REM CALC TRACK AND SECTOR
FROM OC
25240 T=INT((OC-2)/9)+1:S=OC+7-9
*T+1
25250 POKE &HEA,3:POKE &HEB,MQ:P
OKE &HEC,T:POKE &HED,S:POKE &HEE
,Q:POKE &HEF,QL
25260 EXEC DKON
25265 POKE &HFF40,8
25270 RETURN
30000 REM READ COCO DIRECTORY
30001 REM NAM$(N)=ENTRY
30003 REM SG(N) = FIRST GRANULE
30004 REM ALL FILE TYPES WILL BE
 CONVERTED
30005 REM LE=NUMBER OF LAST ENTR
Y
30010 K=-1:N=1:LE=0
30020 REM LOOP
30030 K=K+1
30040 S=INT(K/8)+3
30045 KS=K-8*(INT(K/8))
30050 DSKI$ 0,17,S,A$,B$
30060 C$=A$
```

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```
30070 IF KS>3 THEN C$=B$
30080 KS=KS-(4*INT(KS/4))
30090 T$=MID$(C$,32*KS+1,32*(KS+
1))
30100 FB=ASC(LEFT$(T$,1))
30110 IF FB=0 THEN GOTO 30030 'K
ILLED ENTRY
30120 IF FB=255 THEN RETURN 'DON
E... EXIT ROUTINE
30130 REM PROCESS VALID ENTRY
30140 NAM$(N)=LEFT$(T$,8)
30150 NAM$(N)=NAM$(N)+"."
30160 NAM$(N)=NAM$(N)+MID$(T$,9,
3)
30170 SG(N)=ASC(MID$(T$,14,1))
30180 LE=N:N=N+1:GOTO 30030
40000 REM INPUT 2 GRANS INTO THE
 DATA BUFFER
40001 REM G=FIRST GRAN ON ENTRY
40002 REM G= NEXT GRAN ON EXIT
40003 REM IF NO MORE, G=100 + NU
MBER OF VALID 512 BYTE SECTORS
40004 REM IN THE BUFFER AREA.
40010 DF=0 'FIRST GRAN
40020 REM LOOP
40025 IF DF>1 THEN RETURN
40030 DB=&H6000:IF DF<>0 THEN DB
=&H6900
40040 GT=G:IFGT>33 THEN GT=GT+2
40050 T=INT(GT/2):Q=GT-2*T
40055 S=1:IF Q<>0 THEN S=10
40060 GOSUB 41000
40100 G=PEEK(&H5F00+G) 'GET NEXT
 GRAN #
40110 DF=DF+1
40120 IF G<69 GOTO 40020
40130 G=G-&HC0
40140 IF G>9 GOTO 9100
40150 IF G<1 THEN GOTO 9100
40160 G=G+1
40170 IF DF=2 THEN G=G+9
40180 G=INT(G/2):G=G+100
40190 RETURN
41000 REM BRING GRAN INTO BUFFER
41010 FOR N=0 TO 8
41020 POKE &HEA;2:POKE &HEB,CQ:P
OKE &HEC,T:POKE &HED,S+N:POKE &H
EE,DB/256+N:POKE &HEF,0
41030 EXEC DKON
41035 IF PEEK(&HF0)<>0 THEN GOTO
 9100
41040 NEXT N
41050 RETURN
45000 H=INT(X/256):L=X-256*H:RET
URN
46000 D3=INT (FZ/65536)
46010 FZ=FZ-65536*D3
46020 D2=INT(FZ/256)
46030 D1=FZ-D2*256
46040 RETURN
```

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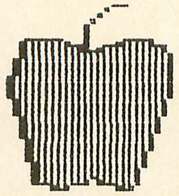

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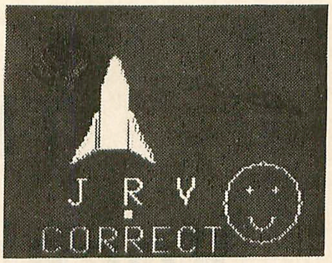

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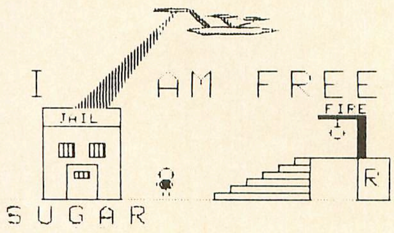

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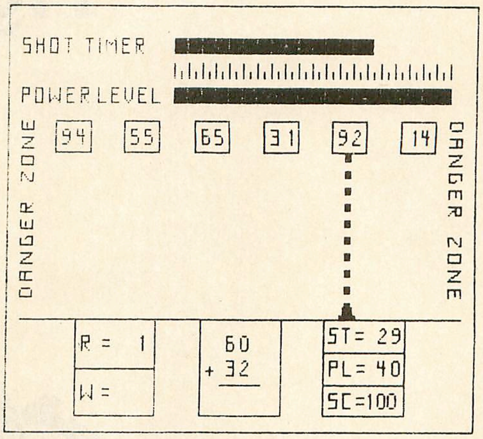

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Language teachers will find it easy to walk . . .

The Vocabulary Tightrope

By Jim Bennett

The computer is an amazingly effective tool for the language teacher to use in motivating students to study vocabulary. The task of memorizing words and definitions can be made much more attractive if dressed up with computer graphics and sounds and presented as a game.

The object of *Tightrope* is to match definitions or synonyms with words in a randomly arranged multiple-choice quiz. Correct answers advance the tightrope walker safely across the rope and add points to the score. Incorrect answers take away points; a third mistake causes the man to fall and the game ends.

If the student does not know the meaning of a word, a See Answer option allows the correct answer to be shown without penalty. The program then automatically throws that word back into the hopper to be pulled out again later in the quiz. Incorrect responses also cause the word to be called up again. When a correct response is given, the word is eliminated and does not reappear.

I have chosen to use the data tape approach in setting up the quiz (instead of writing the words and meanings directly into the program), because I felt strongly that the program would have

---

Jim Bennett teaches art and calligraphy at a private school and a college. He, his wife and three children live in Front Royal, Virginia and are all avid CoCoists.

its greatest usefulness in a real classroom situation if the teacher had complete control over the contents of the quiz and he or she was able to chain-link lists so they could be read into the program in series.

Making a data tape is quick and easy because a tape making and editing routine is provided in the program itself. Simply load *Tightrope*, set up another tape for recording, run the program, and enter `TCHR` at the first prompt. This is the code that accesses the special routine. For making changes in lists previously recorded, enter the word `EDIT`.

Twenty words are required to make up a quiz. A word can be up to 21 letters in length and a definition can use as many as 25 characters (including punctuation and spacing). Since `LINE INPUT` commands have been used, the program accepts all punctuation marks.

The program contains a number of operations that might be of use to others in their programming. The display of text characters on the graphics screen is achieved by reading a series of `DRAW` commands into an array (Line 280) which can then be recalled through the use of ASCII code numbers (Line 800). All the characters on the CoCo keyboard are available except the '#' sign, '&', which draws a check mark, and '@', which underlines the previous character.

The graphics figures were drawn and painted first in block fashion (lines 330-340). Detail was then added pixel by pixel via `PSET` commands (lines 350-370). The speed-up `POKE`, used in three places in conjunction with graphics operations, may be eliminated.

Lines 490-580 contain the routine for setting up a multiple choice quiz. A word is chosen at random and its correct definition and two other definitions are arranged in random order underneath. Choice number four is the See Answer option.

When the quiz ends, either by successfully getting the man to the other side or by making him fall, the program automatically reruns. This allows for smooth transition from quiz to quiz.

(You may direct questions about this program to the author at P.O. Box 425, 1308 Belmont Ave., Front Royal, VA 22630, phone 703-635-1354. Please enclose an SASE when writing.) ☐

105	227	580	9
140	247	710	180
245	180	780	67
340	196	900	25
450	219	END	73

The listing: `TITEROPE`

```
10 '*****************************
20 '*          tightrope         *
30 '*       BY JIM BENNETT       *
40 '*       COPYRIGHT 1986       *
50 '*****************************
55 '
60 CLS:PRINT@71,"A LEARNING PROG
RAM":PRINT@111,"BY":PRINT@136,"J
IM BENNETT,1986"
70 CLEAR1500:PCLEAR8:DIMV(20,40)
,L$(58),Q$(20),A$(20),D(20):PRIN
T@290,CHR$(250)"ready"CHR$(128)"
tape"CHR$(128)"and"CHR$(128)"pre
ss"CHR$(128)"enter"+CHR$(245):IN
PUTW$:IFW$="TCHR"THEN820ELSEIFW$
="EDIT"THEN890ELSEPRINT"  PLEASE
 WAIT WHILE DATA LOADS"
80 SOUND200,2:OPEN"I",#-1,W$:FOR
X=1TO20:D(X)=X:LINEINPUT#-1,Q$(X
):LINEINPUT#-1,A$(X):NEXT:CLOSE#
-1:SOUND200,2:PRINT"  ...ALMOST
READY..."
90 '*******TEXT CHARACTERS******
100 DATA BR14,BU12BR4D8BD4BL1R1B
R10,BU12BR2ND4BR4D4BD8BR8,BU10BR
4R1BD4NL4NR4BD4L1BD2BR10,BR8BU10
L3NU2L2G2F2R3F2G2L2NL3D2BR10,BR4
U4NR2L2H2E2R2NU4R2BR8BD8,BU2F2E6
BD6BR6
105 DATA BU12BR4D4BD8BR10,BU12BR
4G4D4F4BR10,BU12BR4F4D4G4BR10,BU
10BR8G8BU8F8BD2BR6,BU10BR4D4NL4N
R4D4BD2BR10
110 DATA BR4BR1L1G2BR12BU2,BU6R8
BD6BR6,BR4BL1R1BR10,BU2E8BD10BR6
115 DATA BR6E2U8H2L4G2D8F2R4BR8,
BU10BR2E2D12NL2R2BR8,BU10E2R4F2G
8D2R8BR6,BU10E2R4F2D2G2NL4F2D2G2
L4H2BD4BR14BU2
120 DATA BU12BR6G6D2R8NU6D4BR6,B
U2F2R4E2U4H2L6U4R8BR6BD12
125 DATA BU6BR2R4F2D2G2L4H2U8E2R
4F2BR6BD10,BU12R8D4G8BR14,BR6L4H
2U2E2NR2H2U2E2R4F2D2G2NL2F2D2G2B
D2BR8BU2,BE6L4H2U2E2R4F2D8G2L4H2
BD4BR14BU2,BU8BR4R1BD6L1BD2BR10,
BU8BR4R1BD6L1G2BR12,BR6BU10G4F4B
D2BR8
130 DATA BU8NR8BD4R8BD4BR6,BR2BU
10F4G4BD2BR12,BU10E2R4F2D2G4BD4B
L1R1BR10,BD2BL16R14BR2BU2
135 DATA U8E4F4D4NL8D4BR6,U12R4F
2G2NL4F4G4NL4BR10,BU10BR8H2L4G2D
8F2R4E2BD2BR6,U12R4F4D4G4NL4BR10
,U12R8BD6NL8BD6NL8BR6
140 DATA U12R8BD6NL8BD6BR6,BE8BU
2H2L4G2D8F2R4E2U4NL4BR6BD6,U6NU6
R8NU6D6BR6,BR2BU12R2NR2D12NL2R2B
R8,BU12BR2R2NR2D12NG4BR10
145 DATA U12BR8G6NL2F6BR6,BU12D1
2R8BR6,U12F4ND4E4D12BR6,U10NU2F8
NU10D2BR6,BR6E2U8H2L4G2D8F2R4BR8
150 DATA U12R6F2D4G2L6BF4BR10,BR
6L4H2U8E2R4F2D8G2D2F2BU4BR6,U12R
6F2D4G2L2NL4F4BR6,BU2F2R4E2H8E2R
4F2BR6BD10
155 DATA BU12R4NR4D12BR10,BU12D1
```

```
0F2R4E2U10BR6BD12,BU12D8F4E4U8BR
6BD12,BU12D12E4NU4F4U12BR6BD12
160 DATA U2E8U2BL8D2F8D2BR6,BU12
D2F4ND6E4U2BR6BD12,BU12R8D2G8D2R
8BR6
210 '******GRAPHICS DETAIL******
220 DATA 3,66,4,66,5,66,15,106,1
6,106,17,106
230 DATA6,54,11,54,5,60,9,94,14,
94,15,100,5,69,4,68,15,110,16,10
9,17,108,5,11,6,11,18,11,19,11,1
0,13,12,13,14,15,7,52,10,52,7,57
,10,7,8,53,9,53,8,55,9,55,8,58,9
,58,6,64,12,64,8,64,10,64,9,67,1
1,78,12,63,2,65,10,92,13,92,11,9
3
240 DATA 12,93,11,95,12,95,10,97
,13,97,11,99,12,99,8,103,8,104,1
4,104,10,104,12,104,11,107,9,118
,18,105,11,14,10,14,10,15,9,16,1
2
245 DATA 15,9,18,12,18,13,18,10,
19,12,19,11,20,8,21,8,25,10,25,1
2,25,14,25,11,31,11,52,11,33,11,
34,11,35,11,36,11,37,11,38,11,39
250 DATA 8,32,8,38,10,38,12,38,1
4,38,999,12,32,11,30,11,29,11,28
,34,26,34,27,34,28,34,29,34,30,3
3,27,33,28,33,29,30,31,29,31,28,
31,28,29,28,30,29,30,29,32,28,33
,30,30,33,26
260 '******READ CHARACTERS******
270 POKE65495,0
280 FORX=0TO58:READL$(X):NEXT
290 '******SET UP SCREEN********
300 PMODE3,1:PCLS1:FORX=4TO19:CO
LOR2:LINE(4,X*10)-(14,(X*10)+10)
,PSET,B:COLOR3:LINE(244,X*10)-(2
54,(X*10)+10),PSET,B:NEXT:DRAW"C
4BM2,40R250":PCOPY1TO5:PCOPY2TO6
:PCOPY3TO7:PCOPY4TO8
310 PMODE4,5:DRAW"C5BM11,79U12L8
F4G1H4U3R4U6L5U1R6U6R3D6R3U7R1D8
L2D20L3
320 '*****GRAPHICS FIGURES******
330 DRAW"C5BM9,119U12R8G4F1NF1E4
U3L4U6R5U1L6U6L3D6L3U7L1D8R2D20R
3":PAINT(8,60),5,5:PAINT(12,100)
,5,5
340 DRAW"BM8,39U18H3U5R1D4F2R1U5
R4D5R3E2U4R1D4G3L2D19R2":PAINT(1
0,22),5,5
350 FORX=1TO111:READHP:IFHP=999T
HENGET(0,0)-(20,40),V,G:PUT(20,0
)-(40,40),V,PSET:READHP
360 READVP:IFX<25THENCL=5ELSECL=
0
370 DRAW"BM4,40R40":PSET(HP,VP,C
L):NEXT
380 PMODE4,1:COLOR5:LINE(0,0)-(2
55,7),PSET,BF:DRAW"C0S2BM85,6":T
$="SCORE: 0000":GOSUB800:SCREEN1
,1
390 '******ANIMATE CLIMBERS*****
400 FORX=150TO50STEP-20:SOUND50,
1:PMODE4,5:GET(0,50)-(20,90),V,G
:PMODE4,1:PUT(0,X)-(20,X+40),V,P
SET:SOUND200,1:PMODE4,5:IFX=50TH
ENDRAW"C5BM2,90R38"
410 GET(0,90)-(20,130),V,G:PMODE
4,1:PUT(0,X-10)-(20,X+30),V,PSET
:NEXT
420 PMODE4,5:DRAW"BM2,130R38":SO
UND190,1:GET(0,130)-(20,170),V,G
:PMODE4,1:PUT(0,40)-(20,80),V,PS
ET:PMODE4,5:GET(0,10)-(20,40),V,
G:PMODE4,1:PUT(0,10)-(20,40),V,P
SET:SOUND220,3
430 POKE65494,0
440 PMODE3,1:DRAW"S4C4BM67,112":
T$="TIGHTROPE":GOSUB800
450 PMODE4,1:DRAW"C5S2BM67,90":T
$=STRING$(18,"?"):GOSUB800:DRAW"
BM67,130":GOSUB800:FORX=1TO15:PL
AY"T100O4V31ABCDEFG":NEXT:DRAW"B
M64,162":T$="MATCHING WORDS WITH
":GOSUB800:DRAW"BM82,170":T$="TH
EIR MEANINGS":GOSUB800
460 FORX=1TO16:PLAY"T200V31O1ABC
DEFG":NEXT:NN=RND(-TIMER)
470 '*******ERASE SCREEN********
480 POKE65495,0:COLOR0:LINE(29,7
2)-(232,180),PSET,BF:POKE65494,0
490 '*******QUIZ ROUTINE********
500 CN=RND(20):IFD(CN)=0THEN500
510 DRAW"S2C5BM56,80":T$=Q$(CN)+
" = ?":GOSUB800
520 P=RND(3):Z=1
530 S(1)=RND(20):IFS(1)=CN THEN5
30
540 S(2)=RND(20):IFS(2)=CN ORS(2
)=S(1) THEN540
550 FORL=1TO3:V$=STR$(90+(10*L))
:SC$="BM23,"+V$:DRAWSC$:IFP<>L T
HENT$=STR$(L)+". "+A$(S(Z)):GOSU
B800:Z=Z+1:GOTO570
560 T$=STR$(L)+". "+A$(CN):GOSUB
800
570 NEXT:DRAW"BM30,130":T$="4. -
--SEE ANSWER---":GOSUB800:I$=INK
EY$
580 I$=INKEY$:IFI$=""THEN580
590 '********SEE ANSWER*********
600 IFI$="4"THENDRAW"BM30,164":T
$=Q$(CN)+" =":GOSUB800:DRAW"BM50
,176":T$=A$(CN):GOSUB800:FORDD=1
```

```
TO2000:NEXT:GOTO480
610 '******CORRECT ANSWER*******
620 IFVAL(I$)=P THEND(CN)=0:PMOD
E3,1:COLOR3:DRAW"S4BM65,176":T$=
"&CORRECT&":GOSUB800:FORX=1TO6:P
LAY"T150O5ABCDEFG":NEXT:GOTO670
630 IFI$>"4"ORI$<"1"THEN580
640 '*****INCORRECT ANSWER******
650 PLAY"T1O1C":DRAW"BM30,164":T
$=Q$(CN)+" =":GOSUB800:DRAW"BM50
,176":T$=A$(CN):GOSUB800:FORDD=1
TO2000:NEXT:MQ=MQ+1:IFH2=0THEN48
0ELSEIFMQ<3THEN770ELSE740
660 '*******ANIMATE WALKER******
670 PMODE4,1:COLOR5:LINE(127,0)-
(170,6),PSET,BF:TS=TS+100:DRAW"C
0S2BM127,6":T$=STR$(TS):GOSUB800
680 IFH2=0ORH2=208THENE=14ELSEE=
5
690 FORX=1TOE:H1=H1+20:H2=H2+2
700 PMODE4,5:DRAW"C5BM0,40R80":G
ET(H1,10)-(H1+20,40),V,G:PMODE4,
1:PUT(H2,10)-(H2+20,40),V,PSET:I
FH1=20THENH1=-20
710 IFH2=234THENFORX=1TO10:PLAY"
T70V31O4AABBCCDDEEFFGG":NEXT:POK
E65495,0:COLOR0:LINE(29,72)-(232
,180),PSET,BF:COLOR3:PMODE3,1:T$
="G@R@E@A@T@ F@E@A@T@!!!":DRAW"S
4BM51,128":GOSUB800:POKE65494,0:
FORX=1TO15:PLAY"T70V31O4GGFFEEDD
CCBBAA":NEXT:RUN
720 PLAY"T100O1GGBB":FORDD=1TO50
:NEXTDD,X:GOTO480
730 '************FALL*************
740 PMODE4,5:GET(0,0)-(20,27),V,
G:PUT(60,63)-(80,90),V,PSET:DRAW
"S4C5BM61,99U4R1D4E6R6F6U1H6L6G5
U1E5R6F6U2R1D4"
750 PMODE4,1:COLOR0:LINE(26,72)-
(232,180),PSET,BF:PMODE4,5:DRAW"
C5BM120,100R20":GET(120,68)-(140
,100),V,G:PMODE4,1:PUT(H2,8)-(H2
+20,X+39),V,PSET:PMODE4,5:GET(60
,60)-(80,100),V,G
755 PMODE4,1:FORX=45TO155STEP10:
PUT(H2,X)-(H2+20,X+40),V,PSET:PL
AY"T120D":NEXT
760 PLAY"T1C":CLS3:PRINT@192,"YO
UR SCORE IS "TS:PRINT:PRINT"TRY
NOT TO FALL NEXT TIME !!!":FORDD
=1TO4500:NEXT:RUN
770 PMODE4,1:COLOR5:LINE(127,0)-
(170,6),PSET,BF:TS=TS-100:IFTS<0
THENTS=0
780 DRAW"C0S2BM127,6":T$=STR$(TS
):GOSUB800:GOTO480
790 '******DRAW CHARACTERS******
800 FORX=1TOLEN(T$):IN$=MID$(T$,
X,1):IN=ASC(IN$):IFIN<32ORIN>90T
HENNEXTELSEDRAWL$(IN-32):NEXT:RE
TURN
810 '******DATA TAPE MAKER******
820 CLS:PRINT"  ******TEACHER'S
INPUT******":PRINT:INPUT"NAME OF
 QUIZ";W$
830 FORX=1TO20
840 CLS:PRINT"THERE ARE 20 WORDS
 AND MEANINGS:"
850 PRINT"ENTER WORD "X:LINEINPU
T Q$(X):IFLEN(Q$(X))>21THENPRINT
LEN(Q$(X))-21" CHAR'S TOO LONG!"
:GOTO850
860 PRINT
870 PRINT "ENTER MEANING "X:LINE
INPUTA$(X):IFLEN(A$(X))>25THENPR
INTLEN(A$(X))-25" CHAR'S TOO LON
G!":GOTO870
880 NEXTX:GOTO920
890 PRINT:PRINT"READY TAPE - ENT
ER QUIZ NAME":PRINT:INPUTW$:PRIN
T"LOADING QUIZ":OPEN"I",#-1,W$
900 FORX=1TO20:LINEINPUT#-1,Q$(X
):LINEINPUT#-1,A$(X):NEXT:CLOSE#
-1
910 CLS:PRINT"THE OLD TITLE WAS
"W$" WHAT IS THE NEW TITLE";:INP
UTW$
920 CLS:PRINT"  ******EDITING MO
DE******":PRINT:PRINT"PRESS <C>
IF YOU WISH TO MAKE A CHANGE":PR
INT"PRESS ANY OTHER KEY TO SEE N
EXT WORD & MEANING":PRINT:PRINT"
USE <C> TO ENTER ADDITIONAL
ITEMS":PRINT:PRINT"PRESS ANY KEY
 TO BEGIN"
930 I$=INKEY$:IFI$=""THEN930
940 CLS:PRINT"THE TITLE IS "W$
950 FORX=1TO20:PRINT"WORD "X":":
PRINTQ$(X):PRINT"MEANING "X":":P
RINTA$(X):PRINT
960 I$=INKEY$:IF I$=""THEN 960
970 IFI$<>"C"THEN990
980 PRINT"ENTER WORD "X:LINEINPU
TQ$(X):PRINT"ENTER MEANING "X:LI
NEINPUT A$(X):PRINT
990 NEXT
1000 CLS:INPUT"READY RECORDER TO
 STORE DATA-   PUSH enter WHEN R
EADY";Z$:PRINT:PRINT"RECORDING D
ATA": OPEN "O",#-1,W$
1010 FORX=1TO20:PRINT#-1,Q$(X):P
RINT#-1,A$(X):NEXT
1020 CLOSE#-1
1030 PRINT:PRINT"THIS COMPLETES
TEACHER'S INPUT":END
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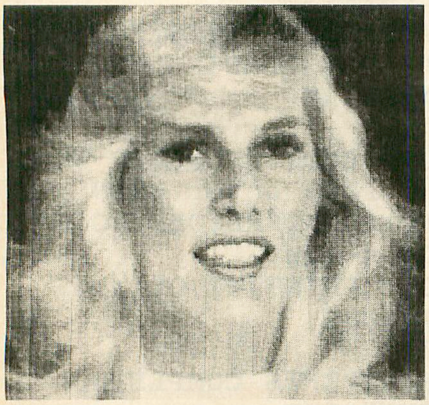

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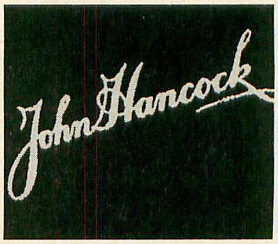

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THE FIFTH YEAR OF RAINBOW

An index to the articles, reviews and authors appearing in THE RAINBOW from July 1985 through June 1986, including an index to RAINBOW ON TAPE.

Compiled and Edited
by Leslie A. Foster

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AN INDEX TO THE RAINBOW
JULY 1985 - JUNE 1986

This is the third index to the *Rainbow*, — the format has been unchanged from last year. Items that are also included in "Rainbow on Tape" have the symbol ● after the page number.

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Leslie A. Foster is a Librarian with Dalhousie Ocean Studies Programme in Halifax, Nova Scotia, Canada. He is the co-editor of "Marine Affairs Bibliography"—an index to law of the sea literature, and has owned a Color Computer since April, 1981.

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Duncan, Richard. "CoBBS: An introduction to the system and its special features." *(1985, November)* 135 ● —Complete BBS program.

Duncan, Richard. "CoBBS: How to modify the program to use the CoCo serial port." *(1986, February)* 100 ●

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CALENDAR *(1986, January)* 43 — Display calendars
CALENDAR *(1986, May)* 64 —Make a calendar
CALLER *(1985, August)* 104 —Assembly demo
CALTIME *(1986, January)* 173 —Calendar generator
CASH *(1986, March)* 73 — Calculate installment loans
CASTLE *(1986, June)* 28 —Adventure game
CHALENGE *(1985, July)* 182 —$100 challenge game
CHARLIE *(1985, October)* 19 —Graphics demo
CHICAGO *(1986, January)* 55 — Music and graphics demo
CHNGQUIZ *(1985, August)* 145 —Elementary education game
CLEANUP *(1985, August)* 90 —Short game
CLOCK *(1986, February)* 56 —Clock utility
CLOCKBAS *(1986, February)* 56 —Clock utility
CNDCAPTL *(1985, September)* 128 —Canadian geography
COAX *(1985, November)* 180 —Ham radio utility
COBBSSYS *(1985, November)* 138 —BBS program
COCOCAD *(1985, October)* 134 —Computer aided design
COCODRAW *(1986, April)* 31 —Part of CoCo Zone adventure
COCOFLOW *(1986, March)* 32 —Aid for drawing flow charts
COCOZONE *(1986, April)* 31 —Adventure game
CODELODE *(1985, July)* 146 —Machine code loader
COL-POEM *(1985, September)* 132 —Write poetry
COLLEGE *(1986, April)* 93 —Calculate a college fund
COMMANDO *(1986, February)* 182 —Game
COMMHELP *(1986, January)* 112 —Job description
CONVERT *(1986, January)* 46 —Measurement conversions
CORE *(1985, December)* 108 —Newcomer's hints
COTERM *(1985, December)* 175 —BBS system
COUNTDWN *(1986, January)* 44 —Pause feature in program
CRASHPRF *(1986, February)* 32 —Disk utility
CREXPFLE *(1986, March)* 129 —Business expense management
CRUN *(1986, February)* 45 —Auto execute tape programs
DANCE *(1985, October)* 85 —GET and PUT demo
DATA *(1986, May)* 121 —Part of ROTATE
DBL SIDE *(1985, July)* 31 —Disk utility
DEBUG *(1986, February)* 39 —Assembly language utility
DEMO *(1985, August)* 96 —Assembly demo
DEMO *(1985, October)* 60 —Color cartoons
DEMO 1 *(1985, July)* 87 —Assembly demo
DEMO 2 *(1985, July)* 87 —Assembly demo
DEMOPOKE *(1985, November)* 164 —Screen poke utility
DIGITIZE *(1986, January)* 229 —Touch pad demo
DISKMENU *(1986, February)* 37 —Disk utility
DISKSTEP *(1986, April)* 149 —Disk utility
DOGHOUSE *(1985, August)* 229 —Action game
DRIVER *(1986, June)* 204 —For FASTLIFE or SLOWLIFE
DUMP1 *(1986, May)* 95 —Graphics screen dump
DUMP2 *(1986, May)* 96 —Graphics screen dump
EARTHTROT *(1985, August)* 74 —Graphics demo
EGGBERT *(1985, August)* 130 —Action game
ELECBOOK *(1985, November)* 31 —Utility for Electronic Learning Book
ELECTRIC *(1986, April)* 103 —Calculate electricty costs
ELEVATOR *(1985, October)* 28 —Elementary education
ENLARGE *(1986, May)* 76 —Part of PICPRT
ENTRTAIN *(1986, June)* 52 —Data for MUSIC+
EXPTRAKR *(1986, March)* 131 —Business expense management
EYESAVER *(1985, July)* 128 —Inverse video
F *(1985, October)* 109 —Assembly graphics
FASTLIFE *(1986, June)* 201 —Game of "Life"
FILESRCH *(1986, February)* 96 —Disk utility
FINDWORD *(1986, March)* 153 —Education
FIRESTRM *(1986, January)* 124 —Game
FISH *(1985, October)* 118 —Assembly graphics
FLAGS *(1986, May)* 42 —Flags of 6 nations
FLARGE *(1985, October)* — —Bonus program
FLASH *(1985, July)* 84 —Assembly demo
FLCNLAIR *(1985, August)* 20 —Game
FLIGHT 1 *(1986, March)* 42 —Graphics demo
FLIGHT 2 *(1986, March)* 44 —Graphics demo
FREEDOM *(1985, August)* 56 —Game
GAMBLERS *(1985, December)* 87 —Gambling game
GERMAN *(1986, April)* 144 —Programming demo
GOPHERIT *(1986, January)* 20 —Game
GOSUBTUT *(1986, June)* 143 —BASIC programming aid
GRAPH *(1986, April)* 138 —Find points on a graph
GRAPHIC1 *(1985, September)* 74 —3-D pictures
GRAPHIC2 *(1985, September)* 75 —3-D pictures
GRAPHIC3 *(1985, September)* 76 —3-D pictures
HALELUJA *(1986, June)* 52 —Data for MUSIC+
HALLEY86 *(1986, April)* 84 —Halley's Comet finder
HAM UTIL *(1985, December)* — —Ham radio log sheet (from Nov. 1985).
HAM UTIL *(1985, December)* — Ham radio log sheet (from Nov. 1985).
HANDIMAN *(1986, April)* 163 —Calculate home expenses
HANDSIGN *(1985, September)* — Bonus sign language
HANOI *(1985, October)* 21 —Graphics demo
HARDCOP1 *(1986, May)* 97 —Graphics screen dump
HARDCOP2 *(1986, May)* 98 —Graphics screen dump
HEART *(1985, October)* 164 —Graphics to demo heart function
HEART *(1986, May)* 176 —Graphics demo
HELLO *(1985, August)* 70 —Disk utility
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HOME *(1986, May)* 21 —Picture of a house
HOMEBDGT *(1986, March)* 77 —Home financial analysis
HORSE *(1985, November)* 131 —Basketball game
HOUSEVAL *(1986, April)* 80 —Determine house value
IDIOMS *(1986, June)* 84 —Elementary education
INDY4K *(1985, August)* 90 —Short game
INSTALL *(1986, February)* 54 —For CRUN
INTRFACE *(1985, August)* 102 —Assembly demo
INVERTER *(1986, January)* 46 —Graphics demo
IRAKEOGH *(1986, April)* 71 —Retirement planner
JETPACK *(1985, July)* 108 —Action game
JIGSAW *(1985, December)* 100 —Newcomer's hints
JOYCOLOR *(1986, January)* 45 —Graphics demo
JSTKLINE *(1986, January)* 228 —Joystick demo
JSTKQUAD *(1986, January)* 229 —Joystick demo
JSTKTEST *(1986, January)* 228 —Joystick demo
JULIE *(1986, April)* 159 —Database program
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KROMICO *(1985, October)* 20 —Graphics demo
KUNG FU *(1986, March)* 67 —Game

LABEL *(1986, May)* 108 —Label maker
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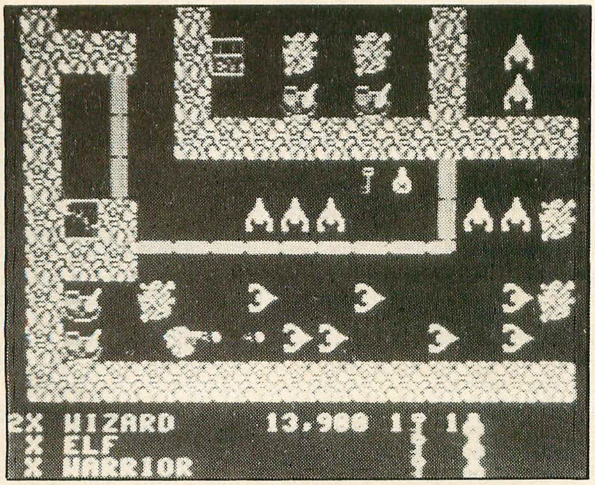
LETRMMRY *(1985, August)* 91 —Short game
LETRSKIP *(1985, August)* 85 —Elementary education
LIFESKL2 *(1986, April)* 120 —Life skills math drill
LINE *(1986, May)* 176 —Graphics demo
LINEDRAW *(1985, October)* 18 —Graphics demo
LISTING1 *(1985, August)* 177 —DRAW demo
LISTING2 *(1985, August)* 177 —DRAW demo
LISTING2 *(1985, December)* 108 —Newcomer's hints
LOADER *(1986, February)* 102 —BBS utility
LOTTOGEN *(1986, January)* 42 —Pick your numbers
LSBDATA *(1986, May)* 126 —Part of ROTATE
MAILLABL *(1985, November)* 247 —Mailing labels
MARQUEE *(1986, March)* 102 —Title and menu screens
MATHGEN2 *(1985, December)* — Math problem generator (from Nov. 1985)
MATHGEN2 *(1985, November)* 80 —Math problem generator
MATHMINR *(1986, January)* 79 —Math quiz
MAXCMP *(1985, July)* 93 —Graphics utility
MAZEGAME *(1985, August)* 88 —Short game
MCQUIZ *(1986, January)* 32 —Multiple choice quiz generator
MEMDIAG *(1986, February)* 67 —Diagnostic program
MEMDUMP *(1986, February)* 41 —Auto execute tape programs
MENORAH *(1985, December)* 196 —Chanukah graphics
MESSAGE *(1985, October)* 176 —Mystery message
MESSAGE *(1986, May)* 37 —Bulletin board messages
MESSAGES *(1985, July)* 45 —Message center
MILELOG *(1986, May)* 96 —Printer demo
MINIGOLF *(1986, May)* 52 —Game
ML GEN (1985, December) — Transfer files over phone (from Nov. 1985)
ML GEN *(1985, November)* 37 —Transfer files over phone
MORTGAGE *(1986, March)* 164 —Mortgage calculations
MOSAIC *(1985, August)* 42 —Lo-res graphics demo
MOYCULEN *(1986, April)* 60 —Adventure game
MS2COCO *(1986, June)* 185 —MSDOS to COCO transfer
MUSFEST *(1985, July)* 20 —4th of July music
MUSIC+ *(1986, June)* 51 —Updated synthesizer program
MUSPAPER *(1986, June)* 24 —Make music sheet paper
NEWTIME *(1986, May)* 139 —Teach children time
NMBRBMPR *(1985, October)* 182 —Arcade game
NMBRMATCH *(1985, November)* 31 —Utility for Electronic Learning Book
NONINER *(1985, October)* 38 —Game
NORMAL *(1986, May)* 79 —Part of PICPRT
OASIS *(1985, July)* 80 —Elementary education
OBJECTIV *(1986, May)* 135 —Generate educational objectives
OCNVRT *(1985, September)* 95 —Terminal part of ORCHESTRA90
ONHOLD *(1986, June)* 18 —Sound and graphics demo
ORATORY *(1985, September)* 182 —Contest scorekeeper
PACE 1 *(1986, May)* 117 —Race handicapper
PAGETURN *(1985, August)* 76 —Graphics demo
PARAJUMP *(1985, July)* 150 —Trigonometry game
PARALIFT *(1985, July)* 150 —Trigonometry game
PART1 *(1986, May)* 28 —Game (Super-rooter)
PART2 *(1986, May)* 31 —Game (Super-rooter)
PATTERNS *(1985, July)* 83 —Elementary education
PFRMDIVE *(1985, September)* 164 —Diving game
PHONE *(1985, August)* 128 —Home helper
PIANOBAS *(1986, June)* 126 —Sound synthesizer
PIANOBIN *(1986, June)* 124 —Sound synthesizer
PIANOSRC *(1986, June)* 133 — Sound synthesizer
PIBASIC *(1986, April)* 232 — Pi to 10,000 digits
PICGRAPH *(1985, September)* 45 —Show child's daily schedule
PICPRT *(1986, May)* 73 —Graphics screen dump
PICSTICK *(1985, August)* 88 —Short game
PINEW *(1986, April)* 231 —PI to 10,000 digits
PIXFILES *(1986, February)* 28 —Transfer graphics files
PLANTLOG *(1986, April)* 125 —Water plants on schedule
PRINTMAT *(1986, May)* 98 —Print formatter
PROMNADE *(1985, July)* — Animated graphics demo (from June 1985)
PTRNBLKS *(1986, January)* 41 —Shape game
PUNCQUIZ *(1985, October)* 46 —Review punctuation marks
PUZLMAKR *(1985, October)* 73 —Jig saw puzzle
PUZZLE *(1985, December)* 111 —Crossword puzzle
PUZZLER *(1986, January)* 28 —Jig-saw puzzle
QUICKZAP *(1985, December)* 129 —Disk utility
RADIALS *(1985, October)* 85 —DRAW demo
RADIO *(1986, April)* 100 —Music and graphics demo
RAINSIGN *(1985, September)* 40 —Teach sign language
RAPDREAD *(1985, July)* 130 —Reading exercise
RCIRCSIN *(1985, October)* 21 —Graphics demo
RCKFEST2 *(1985, July)* 166 —Graphics demo
RECEIPT *(1986, March)* 24 —Business aid
REDGREEN *(1985, September)* 168 —Board type game
REDUCE *(1986, May)* 75 —Part of PICPRT
REFSHEET *(1986, January)* 44 —List printable ascii codes
REFUND *(1986, April)* 96 —Keep track of refund offers
REMOTELD *(1985, December)* — —BBS utility (from Nov. 1985)
REMOTELD *(1985, November)* 112 —BBS utility
REMOTE2 *(1985, November)* 108 —BBS utility
REMOVREM *(1985, October)* 151 —Remove REM statements
REM2DEMO *(1985, December)* — BBS utility (from Nov. 1985)
REM2DEMO *(1985, November)* 112 —BBS utility
REPTGENR *(1986, March)* 145 —Business expense management
RESTORE *(1986, February)* 108 —BASIC utility
REVTYPE *(1985, August)* 102 —Assembly demo
RINGSONG *(1986, June)* 42 —Music and graphics demo
RMTALARM *(1985, December)* 63 —Burglar alarm
ROBOCISE *(1986, February)* 117 —Exercise companion
ROBOMATH *(1985, September)* 20 —Math quiz
ROCKET *(1985, July)* — Animated graphics demo (from June 1985)
ROTATE 1 *(1986, May)* 121 —Printer utility
ROTATE 2 *(1986, May)* 127 —Printer utility
RTR *(1986, May)* 28 —Game (Super-rooter)
RUDOLPH *(1985, December)* 21 —XMAS graphics
RULEOF78 *(1986, March)* 36 — Installment loan payments
RULER *(1986, June)* 119 —Teach how to use a ruler
SAMPLE *(1985, August)* 104 —Assembly demo
SAUCER *(1986, March)* 109 —Game
SCF EDI *(1986, January)* 147 —BBS utitity
SCREEN *(1986, January)* 176 —Graphics utility
SCRNTYPE *(1985, August)* 98 —Assembly demo
SETBAUD *(1986, May)* 226 —Use with SETPRT
SETPRT *(1986, May)* 223 —Change printer parameters in PASCAL
SHADOW *(1986, June)* 44 —Music demo
SHOPLIST *(1986, April)* 219 —Computerized shopping list
SHUTTLE *(1985, August)* 177 —DRAW demo
SINGLONG *(1986, June)* 37 —Music entertainment
SKIPRINT *(1986, January)* 43 —List cassette files to printer
SLOWLIFE *(1986, June)* 201 —Game of "Life"
SMF EDI *(1986, January)* 150 —BBS utility
SMP EDI *(1986, January)* 166 —BBS utility
SNDSTORY *(1985, October)* 128 —SOUND demo
SNKCHASE *(1986, January)* 100 —Game
SOCCER *(1985, August)* 48 —Soccer instruction
SONGGAME *(1986, June)* 75 —Name that Tune game
SONGS *(1986, June)* 67 —Name that Tune game
SOUND *(1985, October)* 88 —Sound synthesis
SOUND 2 *(1986, February)* 166 —SOUND utility
SOUNDBSE *(1986, June)* 112 —Make different sounds
SOUNDCAS *(1986, June)* 63 —PLAY demos
SOUNDISK *(1986, June)* 65 —PLAY demos
SPEAK2ME *(1985, October)* 19 —Graphics demo
SPRINGBD *(1985, September)* — Bonus program
STARFIND *(1985, September)* 56 —Astronomy helper
STARS *(1985, August)* 138 — Short demo for children
STARTUP *(1985, December)* 158 —BBS system
STOCKCAR *(1985, July)* 72 —Simulation game
STRIPLF *(1986, June)* 190 —Use with MS2COCO
STYLIST *(1986, May)* 89 —Epson printer setup
SUBTRACT *(1986, February)* 150 —Elementary education
SUL EDI *(1986, January)* 158 —BBS utility
SUPERCLS *(1986, February)* 162 —Enhanced CLS command
SUPRNOVA *(1986, January)* 37 —Graphic demo
SWIMPOOL *(1986, June)* 146 —Swimming pool maintenance aid
TAPEDIR *(1986, February)* 54 —For CRUN
TEACHAID *(1985, September)* 49 —Teacher's record keeper
TESTMAKR *(1985, September)* 32 —Make multiple choice tests
THE SEED *(1986, January)* 130 —Graphics demo
TICTACTO *(1985, December)* 70 —Trivia game
TIN EAR *(1986, February)* 146 —PLAY tutorial
TITLEMKR *(1986, March)* 159 —Title cards for programs
TITLPOKE *(1985, November)* 164 —Screen poke utility
TITLPRINT *(1985, November)* 164 —Sample title
TRACK *(1985, July)* 149 —Trigonometry game
TRACK40 *(1986, June)* 93 —Disk utility
TRADER *(1986, March)* 20 —Game for young child
TRIKWORD *(1985, September)* 118 —Vocabulary practice
TRIVDATA *(1985, December)* 79 —Data file for TICTACTO
TRIVUTIL *(1985, December)* 72 —Trivia game
TRPSHOOT *(1985, November)* 21 —Trapshooting game
TUGOFWAR *(1985, July)* 150 —Trigonometry game
TUTOR 1 *(1986, June)* 142 —BASIC programming aid
TUTOR 2 *(1986, June)* 143 —BASIC programming aid
TV SHOWS *(1986, March)* 50 —Graphics demo
TYPANIC *(1985, August)* 91 —Short game
USA FLAG *(1985, July)* 116 —Flag picture
USER SYS *(1985, December)* 159 —BBS system
VACATION *(1986, May)* 98 —Vacation planner worksheet
VALNAME *(1986, February)* 23 —Valentine maker
VALPRINT *(1986, February)* 20 —Valentine maker
VARLIST *(1986, March)* 96 —List program variables
VISION *(1985, August)* 231 —Do-it-yourself eye exam
VOCABLRY *(1985, September)* 82 —Simulate a dictionary
WHO AM I *(1986, February)* 135 —Elementary education
WORD+ *(1986, May)* 39 —Make crossword puzzles
WORKOUT *(1986, March)* 28 —Exercise aid
WORLDWAR *(1985, July)* 58 —Simulation game
XFER16 *(1985, November)* 37 —Transfer files over phone
XMASONGS *(1985, December)* 37 —XMAS music
XMASSHOW *(1985, December)* 212 —Christmas graphics
XREF *(1986, February)* 172 —Cross reference program
YOYO *(1986, April)* 145 —Programming demo
ZIP *(1985, September)* 141 —DRAW demo
ZONX *(1985, October)* 67 —Action game
40 35 *(1985, July)* 33 —Disk utility
40 80 *(1985, July)* 31 —Disk utility
64KDRIVR *(1985, October)* 87 —Sound synthesis
64KSETUP *(1986, May)* 83 —Utility

DIECOM PRODUCTS

GANTELET

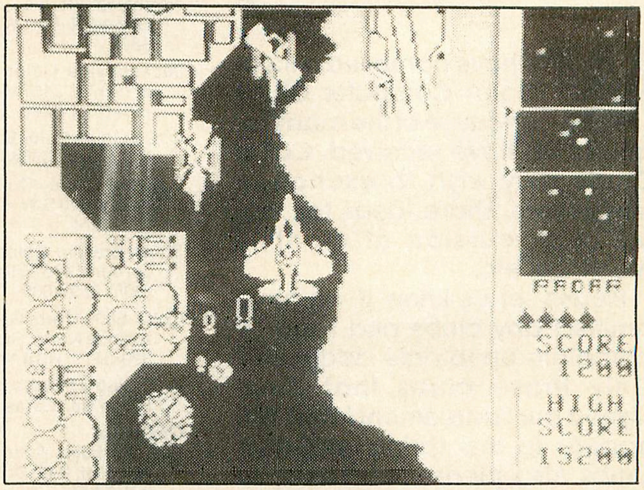


One, two or even three people can play Gantelet at the same time. You and your friends travel through the many levels in search of an exit to the next level. Avoid the Ghosts and other creatures that are out to stop you in your quest. Collect keys to open doors, treasures and magic potions to aid you in your battle. Watch out for hidden traps as you frantically search for the exit to the next level.

64 k required
tape or disk

$28.95 U.S.
$38.95 Can.

Mission: F-16 ASSAULT

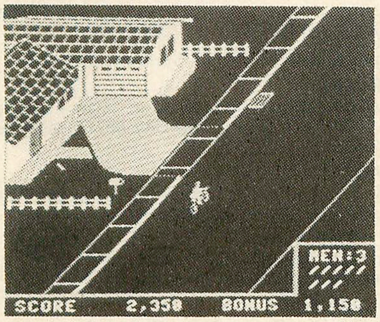


Fly your plane over land and water while avoiding enemy missiles, planes and helicopters attacking from the top and bottom of the screen. Use your radar to track objects as they approach the main screen. Bomb oil refineries, airports and destroy planes before they can take off from the airports. Watch out for missiles fired from hidden missile silos on the ground. Dozens of screens of detailed terrain plus increasing difficulty make this a great game for everyone.

64 k and joystick required
tape or disk

$28.95 U.S.
$38.95 Can.

PAPER ROUTE



As a paper boy, you ride your bike along your route delivering papers to your customers. Break customers' windows or damage their property and they will cancel their subscriptions! Earn bonus points by damaging non-subscribers' property. Avoid pedestrians, cars, and maybe even a mad dog in your attempt to deliver all of your papers! Detailed graphics and lots of surprises make this game a real challenge for everyone.

64 k
joystick required
tape or disk

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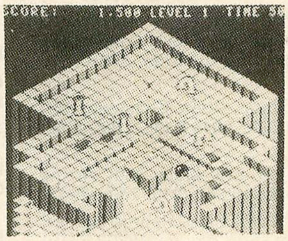
$38.95 Can.

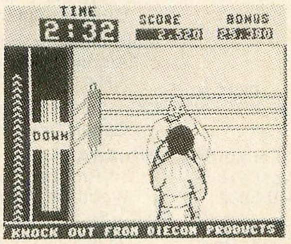
MARBLE MAZE



Move your marble around the mazes in your search for the finish line! Avoid marble eaters, acid puddles and other creatures that inhabit the mazes. Eight different levels and great graphics make this game a must for your collection.

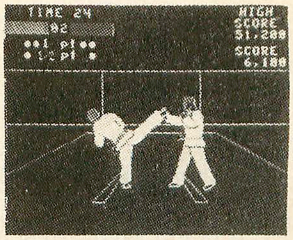
joystick required

KNOCK OUT



Fight against five different boxers in this great boxing game! At first the boxers are easy to knock out, but beware, it gets harder as you move on. The boxers are out to stop you in your quest to become champion of the world. Outstanding graphics make this a must for your collection!

KARATE



Challenge the computer, or a friend to a Karate match! Use various Karate punches and kicks to knock your opponent down and earn points to win the match. When challenging the computer, your opponent's Karate skills increase as you win matches. This game is a challenge for even the expert game player.

joystick required

64 k required **tape or disk** **$28.95** U.S. **$38.95** Can.

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CoCo Community

We have compiled a list of Color Computer Clubs because of the many requests we have received. CoCo Clubs may wish to exchqnge newsletters, share ideas for topics of discussion at monthly meetings, etc.

Please let us know if we have omitted any clubs and send us complete up-to-date addresses. Only those clubs that have signed our "agreement form" will appear in this listing of CoCo Clubs. Also, please notify us if you wish to add or delete any names on this list. Send your information to:

CoCo Clubs
THE RAINBOW
The Falsoft Building
P.O. Box 385
Prospect, KY 40059

ARIZONA

Tucson Color Computer Club, Bill Nunn, 9631 E. Stella, Tucson, 85730, (602) 721-1085

CALIFORNIA

California Computer Federation, (San Fernando Valley Chapter), Pete Ellison, 366 West Providencia Ave., Burbank, 91506, (818) 840-8902

California Computer Federation, (San Francisco Chapter), Dick Stanich, P.O. Box 7007, Redwood City, 94063, (415) 366-4560, BBS (415) 364-2658

Los Angeles-Wilshire Color Computer Users' Group, Norm Wolfe, P.O. Box 11151, Beverly Hills, 90213, (213) 838-4293

The Davis CoCoNuts, Shneor Sherman, 1818 Haussler Dr., Davis, 95616, (916) 758-3195

Ventura County Color Computer Club (VC4), Doug McLaughlin, Oxnard Public Library, 214 South "C" Street, Oxnard, 93030, (805) 984-4636 or BBS (805) 484-5491

Citrus Color Computer Club, Jack Brinker, P.O. Box 6991, San Bernadino, 92412, (714) 824-1866

South Bay Color Computer Club, Patricia Scheffer, 1435 W. 172nd Street, Gardena, 90247, (213) 371-2016

COLORADO

The ESCO Computer Club, David E. Schulz, 1299 Harrison Street, Denver, 80206, (303) 388-6988

DISTRICT OF COLUMBIA

Northern Virginia C.C. Club, Bruce Warner, 14503 Fullerton Rd., Dale City, Virginia 22193, (703) 690-2453

FLORIDA

Northwest Florida CoCo Nuts, Lee Gottcher, P.O. Box 1032, Fort Walton Beach, 32549, (904) 678-8894

Jacksonville Color Computer Club, William H. Brown III, 2411 Hirsch Ave., Jacksonville, 32216, (904) 721-0282

CoCo Chips Color Computer Club, 715 5th Avenue NE, Largo, 33540, (813) 581-7779

Broward County Color Computer Club, Timothy D. Neary, 510 S.W. 64th Ave., Margate, 33068, (305) 972-4074

South Brevard Color Computer Club, Benjamin S. Jerome, 496 Hillside Court, Melbourne, 32935, (305) 259-4609

Color-6809 Users Group, Emery Mandel, 4301 11th Avenue North, St. Petersburg, 33713-5207, (813) 323-3570, BBS (813) 321-0397

C.C. Club of Sarasota, Ernie Bontrager, 4047 Bee Ridge Rd., Sarasota, 33583, (813) 921-7510

GEORGIA

The Northeast Atlanta Color Computer Club, Joe Novosel, P.O. Box 450915, Atlanta, 30345, (404) 921-7418

Atlanta Color Computer Users Group, Terry E. Love, 5155 Maroney Mill Rd., Douglasville, GA 30134, (404) 949-5356

ILLINOIS

Peoria Color Computer Club, Harold E. Brazee, 102 Twin Oak Court, East Peoria, 61611, (309) 694-4703

Illinois Color Computer Club of Elgin, Tony Podraza, 119 Adobe Circle, Carpentersville, 60110, (312) 428-3576

Glenside Color Computer Club, Ed Hathaway, 8 W. Stevenson Drive, Glendale Heights, 60139, (312) 462-0694

Kitchen Table Color Computer Group, Robert Mills, P.O. Box 464, Hanover, 61041, (815) 591-3377

Northern Illinois Color Computer Club, Kenneth Trenchard, Sr., 6145 N. Sheridan Road 30, Chicago, 60660, (312) 973-5208

Motorola Microcomputer Club, Steve Adler, 1301 Algonquin Rd., Schaumburg, 60196, (312) 576-3044

Chicago OS-9 Users Group, John Chasteen, 480 Gilbert Drive, Wood Dale, 60191, (312) 860-2580

INDIANA

CoCo Program Exchange, Erik Merz, 3307 Arrow Wood Dr., Fort Wayne, 46815, (219) 749-0294

Three Rivers Color Computer Club, George Barber, 2410 New Haven Ave., Fort Wayne, 46803, (219) 422-4961

Southern Indiana Computer Club, Route 1, Box 459, Mitchell, 47446

Michiana CoCo Club, Clay Howe, 310 S. Jefferson St., Sturgis, 49091, (616) 651-4248

IOWA

CoCo Questers, Scott Bellman, 2420 Salem Court, Bettendorf, 52722, (319) 359-7702

Dubuque Tandy Users Group, Wesley Kullhem, 1995 Lombard, Dubuque, 52001, (319) 556-4137

KANSAS

KC CoCo Club, Gay Crawford, P.O. Box 11192, Kansas City, 66111, (913) 764-9413

Micro 80 Users Group, Kevin Cronister, 2224 Hope, Topeka, 66614, (913) 272-1353

Color Computer Club of Wichita, Dave Brimmer, 527 N. Pershing Ave., Wichita, 67208, (316) 685-9587

KENTUCKY

Perry County CoCo Users Group, Keith W. Smith, General Delivery, Hardburly, 41747, (606) 439-4209

LOCO-COCO, Jim Spillman, 2405 Woodmont Dr., Louisville, 40220, (502) 454-5331

LOUISIANA

Cajun CoCo Club, Rick Herbert, P.O. Box 671, Crowley, 70526, (318) 788-3148

MASSACHUSETTS

Greater Boston Super Color Users Group, Robert Biamonte, 6 Boulder Drive, Burlington, 01803

CLUB 6809, Jean Salvas, 204 East Street, Springfield, 01104, (413) 734-5163

MICHIGAN

Color C.H.I.P.S., Jack Pieron, 3175 Oakhill Place, Clarkston, 48016, (313) 627-4358

CCUG (Color Computer Users Group), Rich Van Manen, O-599 Lake Michigan Dr., Grand Rapids, 49504, (616) 453-8351

Grand Rapids Area Tandy Users Group, Robert M. Worth, Jr., 1726 Millbank S.E., Grand Rapids, 49508 (616) 245-9324

Greater Lansing Color Computer Users Group, P.O. Box 14114, Lansing, 48901

Greater Kalamazoo Color Computer Club, Jim Rix, 1835 Chevy Chase Blvd., Kalamazoo, 49008, (616) 344-7631

Michiana CoCo Club, Clay Howe, 310 S. Jefferson St., Sturgis, 49091, (616) 651-4248

MISSISSIPPI

Singing River C.C. Club, Mark Welch, 3605 Vancleave Rd., # 118, Gautier, 39553, BBS (601) 875-8688

Gulf Coast Color Computer Assoc., Ed Keels, 22 Christy Cove, Gulfport, 39503, (601) 832-1210

CoCo Art Club, Joel Bunyard, Rt. 16, Box 11, Meridian, 39301, (601) 483-0424

MISSOURI

North County 80 Group, Tom Vogel, 12 Ville Donna Ct., Hazelwood, 63042, (314) 739-4078

Mid-America Color Computer User's Group, Jerry Morgon, 807 Ponca Drive, Independence, 64056, (816) 796-5813

Coconuts, 1610 N. Marlan, Springfield, 65803

NEBRASKA

Siouxland Color Computer Club, Alan Pedersen, 611 D Street, South Sioux City, 68776, (402) 494-2284

NEVADA

C.A.T. F.U.N., Paul A. Osborne, 201 Miners Road, Fallon, 89406, (702) 423-5789

NEW HAMPSHIRE

CoCo Nuts, Matthew Pietrusewicz, R.F.D. #1, Box 548, Pelham, 03076, (603) 635-7098

NEW JERSEY

West Orange CoCo Club, Gregg Favalora, 12 Blackburne Terrace, W. Orange, 07052, (201) 736-1748 (let ring 12 times)

NEW MEXICO

Chaves County Color Computer Club, Lee Mitchell, 1102 Melrose Drive, Roswell, 88201, (505) 623-0789

NEW YORK

Adirondack CoCo Club (Albany Chapter), Ron Fish, Box 4125, Albany, 12204, (518) 465-9793

Adirondack CoCo Club, (Greene County Chapter), Pete Chast, P.O. Box 61, Athens, 12015, (518) 945-1636

Adirondack CoCo Club (Glens Falls Chapter), Richard Mitchell, 39 Center St., Fort Edwards, 12828

Island Color Computer Club, Joseph Castelli, P.O. Box 901, Bellmore, 11710, BBS (516) 783-7506

Kings Byte CoCo Club, Morty Libowitz, 1063 East 84th St., Brooklyn, 11236, (718) 763-4233, BBS (718) 837-2881

C.C. Club of Central N.Y., Joseph Short, 248 S. Fourth Ave., Ilion, 13357, (315) 895-7730

Rockland County Color Computer Users Group, Harold L. Laroff, P.O. Box 131, Monsey, 10952-0131, (914) 425-2274

Olean Area CoCo Users Group, Herman L. Smith, P.O. Box 216, Olean, 14760, (716) 933-7488, BBS (716) 933-7489

The Rochester S-80 Computer Club, Inc., Gary Panepinto, P.O. Box 15476, Rochester, 14615, (716) 392-6133

New York Color Computer User Group, Carl Glovinsky, 15 Bolivar St., Staten Island, 10314, (718) 761-0268

NORTH CAROLINA

Bull City CoCo Users Group, Todd Wall, 5319 Durand Drive, Durham, 27703, (919) 598-1348

Raleigh Color Computer Club, David Roper, P.O. Box 680, Garner, 27529

OHIO

Color Computer Club, Inc., William Wills, P.O. Box 468, Canfield, 44406

Dayton Color Computer Users Group, Steven E. Lewis, 4230 Cordell Dr., Dayton, 45439, (513) 299-3060

Dayton Area Color Computer Users Group, David R. Barr, 2278 Yorkshire Pl., Kettering, 45419, (513) 293-2228

Greater Toledo Color Computer Club, William Paul Saba Sr., 3423 Cragmoor Ave., Toledo, 43614, (419) 385-9004

Tri-County Computer Users Group, William J. Loeffler, 2612 Dale Avenue, Rocky River, 44116, (216) 356-0779

Miami Valley CoCo Club, Tim Ellis, 1805 W. Parkway Dr., Piqua, 45356, (513) 773-2244

OKLAHOMA

Green Country Computer Association, Michael Keller, P.O. Box 2431, Tulsa, 74101, (918) 245-3456 (DATA)

PENNSYLVANIA

HUG-A-CoCo, George Lurie, 2012 Mill Plain Court, Harrisburg, 17110, (717) 657-2789

Penn-Jersey Color Computer Club, P.O. Box 2742, Lehigh Valley, 18001

Skyline Color Computer Club of Berks County, Lewis F. Brubaker, 4874 Eighth Ave., Temple, 19560, (215) 921-3616

Pittsburgh Color Group, Ralph Marting, P.O. Box 351, West Mifflin, 15122, (412) 823-7607

RHODE ISLAND

New England CoCo Nuts, P.O. Box 6604, Providence, 02940

SOUTH CAROLINA

LoCo CoCo Club, Larry Coyle, 4334 Flynn Dr., Charleston, 29405, (803) 747-0802

Midlands 80 Computer Club, Frank Eargle, P.O. Box 7594, Columbia, 29202, TBBS (803) 791-7389

Spartanburg County CoCo Club, Lawrence Easler, Jr., Rt. 1 Highway 221, Spartanburg, 29302, (803) 578-3120

TENNESSEE

Tri-Cities Computer Club, Gary Collins, P.O. Box 4506 CRS, Johnson City, 37602-4506, (615) 929-1862

TEXAS

The San Antonio Color Computer Club, James Leatherman, 2430 Rawhide Lane, San Antonio, 78227

UTAH

Salt City CoCo Club, Dennis Mott, 720 E. Browning Ave., Salt Lake City, 84105, (801) 487-6032, BBS (801) 487-6787

VIRGINIA

Northern Virginia C.C. Club, Bruce Warner, 14503 Fullerton Rd., Dale City, 22193, (703) 690-2453

Central Virginia Color Computer Club, Roger Lee, Rt. 2 Box 175, Madison Heights, 24572

WASHINGTON

Northwest Computer Club, Larry Haines, East 2924 Liberty, Spokane, 99207, (509) 483-5547

Mount Rainier Color Computer Club, Ron Amos, 2450 Lenore Drive N., Tacoma, 98406, (206) 752-8735

WEST VIRGINIA

Mil-O-Bar Computer Club, Jim LeMaster, P.O. Box 130, Ona, 25545, (304) 743-4752 after 4 p.m.

Blennerhassett CoCo Club, David Greathouse, 1306 Wells Circle, Parkersburg, 26101

WISCONSIN

Southern Wisconsin CoCo Club, David C. Buehn, 24607 67th Street, Salem, 53168, (414) 843-3830

CANADA

ALBERTA

Calgary Color Computer Club, Don Towson, 832 Cannell Rd. S.W., Calgary, T2W 1T4, (403) 281-2855

Edmonton CoCo Users Group, Dexter Dombro, P.O. Box 4507 Stn. South, Edmonton, T6E 4T7, (403) 439-5245

BRITISH COLUMBIA

Salmon Arm CoCo, David Coldwell, RR #4, Site 26 Comp. 13, Salmon Arm, V1E 4M4

MANITOBA

Winnipeg Micro-80 Users Group, Robert Black, 1755 King Edward St., Winnipeg, R2R 0M3, (204) 633-7196

NOVA SCOTIA

Halifax Dartmouth CoCo Users Group, Eugene Naugler, P.O. Box 572, Dartmouth, B2Y 3Y9

Colour Computer Halifax User Group (CoCo Hug), Paul A. Power, 6354 London St., Halifax, B3L 1X3, (902) 455-6341

ONTARIO

ESSA Color Computer Club, Albert L. Ley, 40 Perry Street, Barrie, L4N 2G3, (705) 728-9481

K-W CoCo Club, P.O. Box 1291, Station C, Kitchener, N2G 4G8

Kingston CoCo Club, Kenneth Bracey, 316 Westdale Ave., Apt. 4-C, Kingston, K7L 4S7, (613) 544-2806

London CoCo Nuts Computer Club, Harry K. Boyce, 180 Concord Road, London, N6G 3H8, (519) 472-7706

Niagara Regional CoCo Club, Gerry Chamberland, 6843 Cumberland Crt., Niagara Falls, L2H 2J9, (416) 357-3462

QUEBEC

Club d'Ordinateur Couleur du Quebec, Inc., Centre de Loisirs St-Mathieu, 7110- 8e Ave., St-Michel, Montreal, H2A 3C4, (514) 270-7507

Club ORCO-RS, Jacques Bedard, 33 Lisiere, St-Constant, P.Q., J0L 1X0, (514) 632-4311

Le Club Couleur du Nord, Gabriel Pigeon, C.P. 315, Barraute, P.Q., J0Y 1A0, (819) 734-2577

SASKATCHEWAN

Saskatoon Color Computer Club, L. Curtis Boyle, 35 Bence Crescent, Saskatoon, S7L 4H9, (306) 382-1459, BBS (306) 384-8040

FOREIGN

AUSTRALIA

Blacktown City TRS-80 Colour Computer Users Group, Keith Gallagher, P.O. Box 264, Riverstone, New South Wales, 2765, (02) 627-4624

COCOPUG, Harry Murphy, 8 Lois Court, Regentsville, New South Wales, 2750

CoCoHUG (Color Computer Hobart Users Group), Robert Delbourgo, 15 Willowdene Avenue, Sandy Bay, Hobart, Tasmania, 7005

ISRAEL

The First Color Computer Club of Israel, J. Yosef Krinsky, Data Processing Division, 1 Radin Street, Netanya, Israel, (053) 52277

MEXICO

Mexcoco Users Group, Sergio Waisser, Paseo de la Soledad #120, Mexico City, D.F., 53920, phone 294-36-63

the NETHERLANDS

Color Computer Club Benelux, Jorgen te Giffel, Eikenlaan 1, 4641 GB Ossendrecht, the Netherlands

WEST GERMANY

First CoCo Club Hamburg, Theis Klauberg, Krietkamp 27A, Hamburg 65, West Germany 2000, FRG, phone (040) 536-36-76

new clubs

Editor:

I would like to announce the existence of the Mobile Color Special Interest Group. For more information, call (205) 473-1049 after 4 p.m. or write to 2056 South McVay Drive, 36605.

Steve Poates
Mobile, AL

• I have a new club called Good CoCo. We now have a newsletter including free BBS numbers for the states and some of Canada, and discounts on programs written by Good CoCo staff. If you would like to join, please send $12.50 for a one year membership or $2 for a sample copy of the newsletter to 3002 Liberty Tree Lane, 85741.

Good CoCo
Tucson, AZ

• Anyone interested in joining the Cajan CoCo Club of Lafayette, please write to P.O. Box 671, 70526.

Rick Hebert
Crowley, CA

• We would like to announce the existence of the Sacramento CoCo Club. For information, write to P.O. Box 214733, 95821-0733; or call BBS (916) 486-1594.

Bill Drennon
Sacramento, CA

• The Pocatello Color Computer Club meets the second Tuesday of every month at ISU Vo-Tech, Trade and Tech, Room 316, 7 p.m. For more information contact me at 1730 West Quinn Road, 83202.

Randy Poppe
Pocatello, ID

• I take great pride in introducing your readers to the Atlanta Color Computer Users Group based at P.O. Box 561, Douglassville, 30134. At present, we have approximately 80 members and have been in existence for several years. Meetings are the third Wednesday of the month at Nash Middle School in Cobb County, 7 p.m. (near Marietta-Smyrna area). Our newsletter is one of the best in the southeast and membership is only $20 per year. For more information, contact Gary McConville (404) 949-0369, Terry Love (404) 949-5356 or Charles Langley (404) 949-4119.

Terry E. Love
Douglasville, GA

• I would like to announce the start of the New Philadelphia Color Computer Users Group. The club has no fees. It was set up for exchanging ideas and information. A newsletter will be passed out every month to members. The newsletter will contain Pokes, Peeks, Execs, BBSs, articles and programs. Call (216) 364-5061 or (216) 343-8083 or write to 1025 Fourth Street NE, 44663.

Alvin Tanpoco
New Philadelphia, OH

• The Seacoast CoCo Tug Club meets the second Wednesday of every month at the Rye Public Library in Rye Center. For more information, send inquiries to 34 Rockrimmon Road, 03848.

Red Ahlberg
Kingston, NH

• I would like to announce the forming of the CoCo Nuts Color Computer Club. We will have a newsletter filled with programs, contests, hints on games, etc. For more information send an SASE to R.F.D. #1, Box 548, 03076.

Matt Pietrusewicz
Pelham, NH

• We would like to inform CoCo owners of our new meeting place and time. We now meet at Showbiz Pizza in Foothills Mall every second and fourth Monday of each month, unless a big holiday occurs on or very close to the meeting date. Meetings start at 6:30 p.m. We welcome anybody who owns any type of computer and people who are interested in them. For information, write to Route 14, Box 289, 37801.

Aaron Sentell
Maryville, TN

• Announcing the Middle Tennessee TRS-80 Users Group. For information write to 1809 Eastside Avenue, 37206 or call our BBS (615) 262-2773.

Steve Qualls
Nashville, TN

• I would like to announce a change of name for our club. Formerly the Color Computer Connection, we are now the 6809 Club. We invite other clubs to exchange public domain software with us. We would also like to correspond with others about new pokes, hints, etc. All correspondence should be sent to 2449 Popham Ln. #246C, 78617.

Earl Quinones
Del Valle, TX

• Announcing the Bennington Color Computer Users Group. For more information write to Box 14, Willow Road, 05201 or call (802) 442-4094.

Joseph Rogers
Bennington, VT

• Please inform your readers of a new CoCo club in Seattle. We have a monthly newsletter including one-liners, tips on Adventures, high scores, reviewing programs and much more. For more information write to 18747 47th Ave. NE, 98155. Please include an SASE.

Mitch Hart
Seattle, WA

• I'm starting a Color Computer games club called The Gargon. There are no dues and we print a newsletter every month. The club is for getting public domain games (and other programs) in circulation. Anyone is welcome. If you would like to join, send a self-addressed stamped envelope to 112 Strangeway Avenue, 53555, or call (608) 592-3597.

Bill Mittel
Lodi, WI

```
From: BOS1B::TRAVELR
To:   EDITORS
Subj: NEW COCO CLUB

  A new CoCo club has been formed in
northern Virginia. It services the
Fairfax County area, including D.C.
and Maryland. For more information,
call the Handy Tandy BBS at (703) 573-
7282.
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• Anyone interested in forming a TRS-80 Color Computer club in the northern Virginia area, please contact Mike Saint at (703) 425-0053. If you would like to contact via modem, call CoCo Time BBS at (703) 425-0874. Leave a message to SysOp with your name and number.

Jeff Beckerman
Burke, VA

• I would like to inform your readers that there is a French CoCo club in Quebec. The club is called Quebec CoCo and works by corresponding. There are not meetings. We have a newsletter to exchange programming hints and programs. For more information, write to 10 de la ronde, Cap-Saute, G0A 1L0.

Eric Bernatchez
Cap-Saute, Quebec

• This letter is to announce the formation of the Argentine Color Computer Club. We have 100 members and are interested in any kind of application or program for the Color Computer. We are looking for clubs to correspond with from any part of the world. If you are interested, please write to:

Pablo Morano
Lavalle 1438 "1" Cuerpo 5º Piso RR
(1048) Buenos Aires
Argentina

• Anyone interested in LOGO language and forming The 6809 Logo's Club, can write me at:

Newton Luiz Nickel
Travessa Frei Caneca
11 Apt.: 53
Curitiba, Parana
Brazil 80010

- I would like to inform everyone of a new club in Kelowna called the Kelowna Color Computer Club. Anyone interested, please contact me at (604) 763-1259 or write to 1147 Lawson Avenue, V1Y 6T7. Other club inquires appreciated.

Colin McMillan
Kelowna, British Columbia

- As dedicated owners and users of the TRS Colour Computer, we are interested in hearing from other CoCo Clubs with the possibility of the exchange of newsletters and other information.

Presently, we hold a general meeting on the third Tuesday of the month at Discovery Park (BCIT) 3700 Gilmore Way Burnaby. Entry is through security between 7:10 and 7:30 p.m. only. We also have a special interest hardware group which meets on the second Sunday morning and the fourth Tuesday evening at a member's house. Write to us at P.O. Box 76734, Postal Stn. S, V5R 5S7.

Don MacDonald
Vancouver, British Columbia

- The ESSA Colour Computer Club is pleased to announce the startup of a monthly newsletter called The CoCo Examiner. Our club will also be starting a BBS soon. For more information call (705) 728-8139 or write to R.R. #2, L4M 4S4.

Mark Ervine
Barrie, Ontario

- The Toronto Color Computer Club is looking for other CoCo clubs around the world that are interested in trading public domain club libraries. In addition, we are also willing to exchange our newsletter with other club newsletters for the purpose of publishing articles of interest. This will allow us all to deliver interesting articles from a variety of sources to all clubs that participate. Please note that The Toronto Color Computer Club newsletter is not copywrited. All we ask is that when publishing articles from our newsletter, you state it is from the The Toronto CoCo Club. We will do the same for you. For more information, please write to 5 Penzance Drive, M1K 4Z4.

Wayne Finlay
Scarborough, Ontario

- I want to inform everyone of the existence of the Club Ordico De Shawinigan. Our activities take place every Wednesday at 7 p.m. at the local CEGEP. For information write to C.P. 1822 Station B.

Michel Bruneau
Shawinigan, Quebec

- The First Color Computer Club of Israel is in need of public domain programs. Since our location prohibits us from calling BBSs, we are requesting any individuals and/or clubs to send us public domain programs on ROM cassette or disk to add to our library. Please label all parcels with their value.

J. Yosef Krinsky
Radin College
1 Radin Street
Netanya, Israel

- Any CoCo user in Puerto Rico who would like to be a member of our club can call me at 755-7598 or write to me at:

Pedro A. Torres
Cuernavaca 1699
Venus Gardens
Rio Piedras, Puerto Rico 00926

Two-Liner Contest Winner . . .

This program requires joysticks to operate. It is a basic alarm. Run the program and adjust your joystick 'til the alarm stops sounding. Then be creative and set it up to catch people who try to invade your CoCo room. Our more technically minded readers will be able to embellish the idea presented here.

The listing:

```
0 FOR Z=1TO50:NEXTZ:CLS:PRINT"
ALARM - BY ERIK MCCULLOUGH":A=JO
YSTK(0):B=JOYSTK(1):C=A*B:PRINT@
64,"SET JOYSTK BETWEEN 970 AND 1
010":PRINTTAB(13)C:IFC<970 OR C>
1010 THEN PRINT@265, "--INTRUDER
--":GOTO 1:ELSE PRINT@265, "ALAR
M IS SET":RUN
1 SOUND 150,8:SOUND 100,8:RUN
```

Erik McCullough
Lafayette Hill, PA

(For this winning two-liner contest entry, the author has been sent copies of both *The Rainbow Book of Simulations* and its companion *The Rainbow Simulations Tape.*)

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Preschool II - adding	Pre-K	16K Ext.	11.95
Preschool III - alphabet	Pre-K	16K Ext.	11.95
Music Marvel-play songs	Pre-K,1	16K-Ext.	11.95
Arrow Games - 6 games	Pre-K,1	32K-Ext.	21.95
First Games - 6 games	Pre-K,1	32K-Ext.	24.95
Mr. Cocohead-facemaker	K-3	16K-Ext.	16.95
Bentley Bear	Pre-K	32K-Disk	29.95

LANGUAGE ARTS

PROGRAM TITLE	GRADES	MEMORY	PRICE
Beyond Words 1-3 parts	3-5	32K-Ext.	19.95
Beyond Words 2-3 parts	6-8	32K-Ext.	19.95
Beyond Words 3-3 parts	9-12	32K-Ext.	19.95
Vocabulary 1-1000 words	3-5	32K-Ext.	19.95
Vocabulary 2-1000 words	6-8	32K-Ext.	19.95
Vocabulary 3-1000 words	9-12	32K-Ext.	19.95
Context Clues	4,5,6,or 7	16K-Ext.	17.95
Cocojot - jotto game	3-up	16K	11.95
Reading Aids - 4 parts	2-4	16K-Ext.	19.95
King Author - writing tool	2-6	16/32 Ext.	29.95
Cocowheel of Fortune	4-up	32K-Ext.	19.95
Context Clues	2-3	32K-Ext.	19.95

FOREIGN LANGUAGES

PROGRAM TITLE	GRADES	MEMORY	PRICE
French Baseball-200wds.	4-up	16K-Ext.	11.95
French Baseball-500wds.	4-up	32K-Ext.	19.95
Spanish Baseball-200wds	4-up	16K-Ext.	11.95
Spanish Baseball-500wds	4-up	32K-Ext.	19.95
Italian Baseball-200wds.	4-up	16K-Ext.	11.95
Hebrew Alphabet	beginners	16K-Ext.	11.95
Hebrew Utility	drawing utility	16K-Ext.	15.95

CRITICAL THINKING PROBLEMS

PROGRAM TITLE	GRADES	MEMORY	PRICE
Memory Castle-Sunburst	4-up	32K-disk	44.95
Factory by Sunburst	4-up	32K-disk	44.95
Pond by Sunburst	2-up	32K-disk	44.95
Teasers by Tobbs-Sunb.	4-up	32K-disk	44.95
Inner City - simulation	7-up	32K-disk	49.95
Find The Math Sequence	4-up	32K-Ext.	19.95
Stranded-graphic advent.	4-up	32K-disk	24.95

TEACHER/STUDENT AIDS

PROGRAM TITLE	GRADES	MEMORY	PRICE
Colorgrade - gradebook	Adult	32K-disk	29.95
Quizmaker - write quizzes	5-up	32K-Ext.	24.95
ETT typing tutor (CocoWarehouse)	4-up	16K-Ext.	21.95
The Puzzler (ColorConnection)	4-up	32K-disk	29.95

MATH

PROGRAM TITLE	GRADES	MEMORY	PRICE
Opening a Bank Account	4-7	32K-disk	24.95
Dollars & Sense	2-4	16K-Ext.	14.95
McCoco's Menu	3-5	16K-Ext.	14.95
Moneypak	2-5	32K-Ext.	24.95
Graph Tutor	3-7	32K-Ext.	19.95
Graph-It	7-up	16K-Ext.	14.95
Math Invaders	1-8	16K-Ext.	17.95
Mathquiz - 4 operations	2-5	32K-Ext.	19.95
Addition & Subtraction	2-3	16K	11.95
Skill Tutor Series			
Division Tutor	3-7	16K-Ext.	14.95
Multiplication Tutor	3-7	16K-Ext.	14.95
Factors Tutor	5-8	16K-Ext.	19.95
Fractions Tutors (3 programs) addition, subtraction or multiplication	4-8	16K-Ext.	19.95ea.
Trigonometry	8-10	32K-Ext.	24.95
Equations Linear	7-9	32K-Ext.	19.95
Equations Quadratic	8-11	32K.Ext.	19.95
Arith. Diagnostic Disk	3-8	32K-disk	49.95
Fraction Diagnostic Disk	4-9	32K-disk	49.95
Verbal Problems Series			
Distance Problems	5-8	32K-Ext.	19.95
Area & Perimeter	5-8	32K-Ext.	19.95
Pizza Game	3-5	32K-Ext.	19.95
Sales & Bargains	6-8	32K-Ext.	19.95
Comparison Shopping	4-7	32K-Ext.	19.95
Binary Dice Game	4-up	32K-Ext.	19.95

SOCIAL STUDIES

PROGRAM TITLE	GRADES	MEMORY	PRICE
Know Your States	5-up	32K-Ext.	19.95
History Game	5-up	32K-Ext.	14.95
States & Capitals	5-up	32K-Ext.	19.95
Explorers & Settlers	4-up	32K-Ext.	19.95
Famous American Women	6-up	32K-Ext.	19.95
Street Map Game	3-5	32K-Ext.	19.95

MISCELLANEOUS

PROGRAM TITLE	GRADES	MEMORY	PRICE
Name That Song 1,2,or 3	2-up	16K-Ext.	11.95
Music Drill	3-up	16K-Ext.	19.95
Science Game	8-up	32K-disk	29.95
Computer Literacy	6-up	32K-Ext.	19.95
5 Educational Programs with Lightpen	1-2 or 3-6	32K-disk	44.95
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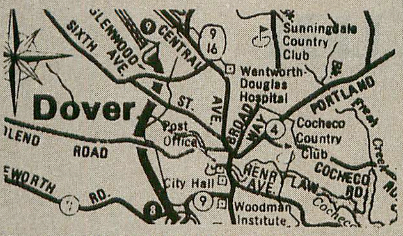

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Rare Bird Won't Run on Disk System

By Dan Downard
Rainbow Technical Editor

• *I have a 64K CoCo 1.1 that I upgraded myself. I am very happy with it until I come to a program like* The Old Time Banner Printer *(May 1986). I would like to be able to run this program from disk but there isn't enough memory. Can I take the old 16K chips and piggyback them on the 64K chips and get 80K? If not, is there any way I can get more memory space available so I can run a program like* Banner *from disk?*

Mike MacMonagle
Roy, UT

Mike, *The Old Time Banner Printer* is indeed a rare program, in that it will not run with a disk system. The problem is that disk buffers, the memory reserved to transfer the disk data to RAM, occupy a sizable part of lower memory. At the same time, the programming techniques used in this article could be improved to make the program a little more compact and faster. This is usually not necessary, but who knows what some people will do for a large banner saying "The Rainbow."

You cannot piggyback another 16K set of RAM chips on top of the 64K set. You can piggyback another set of 64K chips, but you will have to add bank selection hardware, and develop software to switch between the two banks of 64K chips. An easier way to solve the problem is to buy one of the commercially available 256K upgrade kits mentioned in recent reviews. This will still not let you run the program mentioned, but you will have a lot more memory.

Dan Downard is an electrical engineer and has been involved in electronics for 27 years through ham radio (K4KWT). His interest in computers began about eight years ago and he has built several 68XX systems.

BBS Setup

• *I am interested in setting up a multi-user BBS on my CoCo. Is this possible? Can the CoCo support a few users at one time? If so, how do I go about setting up the system? Also, can you print a list of some commercial and public domain BBS software and hardware packages? I have had a heck of a time trying to find one.*

Arie Moller
Kensington, MD

The only way I know to have a multi-user BBS, Arie, is to use OS-9. Even then, your system will be very limited due to the fact that you are working with a 64K system. One BBS I have seen that does this is Infoworld by Paris Radio Electronics.

One public domain BBS I am aware of is COBBs, which recently appeared in THE RAINBOW. From all of the reports I have heard it is very good.

Ham It Up, RAINBOW

• *I would like to add my request to those you have already printed about more CoCo software for Hams. I wonder if anyone has tackled the problem of building a plug-in such as the*

"Doctor DX" module that is available for the Commodore 64.

Ray Peterson
Bicton, W. Australia

Ray, I have a lot of requests for Ham radio software. We print almost every article of this type that is submitted. As I have said before, if anyone knows of commercial or public domain Ham radio software, especially for packet, RTTY/CW and slow scan, please write and we'll publish a compiled list.

Slow Scroll Help

• *Enclosed is the slow-scroll program I have been using for several years. I keep it on disk and use it with both tape and disk programs and with disk directories.*

Paulette Grantham
Palo Alto, CA

```
1 FORX=1000TO1010
2 READA:POKEX,A:NEXTX
3 POKE383,126:POKE384,3:POKE385,
232:POKE422,126:POKE423,3:POKE42
4,232   .
4 DATA 52,16,142,0,1,189,167,211
,53,16,57
5 NEW
6 'RUN, THEN POKE 1003,200 FOR
SLOW SCROLLING (VARY 200 FOR
DIFFERENT SPEEDS)
```

Thanks for the help, Paulette. No more pushing the SHIFT-'@' keys due to your generosity.

Curing Printer Ills

• *I am writing in response to the problems expressed with the SG-10 printer and the* Graphicom/Hardcopy *family of printer drivers. I found that the best way to use the printer is in the IBM mode (DIP switch 2-2 off).*

Bill Kennon
San Diego, CA

Thanks, Bill. After discussing the matter with the guys at Computize, another modification was made to the program that added a little more line delay. This seemed to cure the problem, too.

The No-Load *CoCo Max*

• *I own a gray CoCo that I upgraded to 64K. I have no problem running the* VIP Library *or the DS-69. My problem occurs with* CoCo Max. *It loads, but the working screen is garbage and cannot be used. I purchased* CoCo Max *from J.&J. Electronics in Winnipeg, Canada. They verified the disk and the pack — all OK. I contacted Colorware in New York and they returned me* CoCo Max II. *It still won't load. I purchased a CoCo checker program from J.&J. Electronics and all my systems check out OK. Everyone has given me good service but I still cannot use* CoCo Max. *What's the answer?*

Alain Jeansonne
St. Augustine, Canada

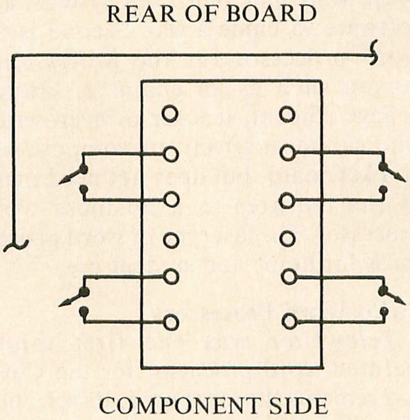
Alain, I would check your memory upgrade, or possibly the 6809E microprocessor. The *VIP Library* does not require 64K, but *CoCo Max* does.

Terminal Confusion

• *I recently tried to add a front panel on/off switch. My problem is there are 12 terminals on my on/off switch and I don't know which two terminals to solder to. I have a gray CoCo with a type 'F' board.*

Mike Moran
Simsbury, CT

Mike, four sets of contacts are actually used to turn your CoCo on. Two of the contacts are in parallel, due to current rating required. The proper terminology for this switch is S1. See the diagram below for the correct connections:



Three-Signal RGB not Compatible

• *I am considering buying a color monitor. What is the difference between a composite and RGB monitor? Are they both usable with the CoCo? Also, are video drivers difficult to install?*

Donald Imwalle
Batavia, OH

Donald, a composite color signal has all of the color information on one signal. This is the type of signal generated by all of the CoCo video drivers I have seen. Most are relatively easy to install and come with adequate instructions.

An RGB color signal has three separate signals — red, green and blue — and is not compatible with the CoCo or any commercial drivers that I am aware of. This is due to the way video is generated inside the CoCo. It is not easily converted to RGB.

Joystick Coordination

• *I have a problem with my 'E' version Color Computer. The problem is with the joysticks. When I try to read the joystick ports, the computer gives me the wrong coordinates. I tested the joysticks on my other CoCo, so I know they work.*

When I read the right joystick from left to right, I get a range from 10 to 19 and when I read it top to bottom, it goes from seven to 56, often skipping many coordinates. When I read the left joystick left to right, I get a range from nine to 56 and the top to bottom range is the same as the left and right. Every time I use the joysticks they skip coordinates or give their wrong location. Can you please tell me what is wrong with the joystick ports and how I can fix them?

Andrew Harkenrider
Grosse Pointe, MI

I suggest replacing U1 and U14. These two chips on the rear of the board near the joystick inputs interface the joysticks.

Your technical questions are welcomed. Please address them to: Downloads, THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We reserve the right to publish only questions of general interest and to edit for space and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.

Your technical questions may also be sent to us through the MAIL section of our new Delphi CoCo SIG. From the CoCo SIG> prompt, pick DELPHI MAIL, then type SEND and address TO: DANDOWNARD.

ACCESSIBLE APPLICATIONS

CoCo Word Processing

By Richard A. White
Rainbow Contributing Editor

Word processing is the leading task done on microcomputers. Word processing programs come in a variety of types for various purposes. In the beginning, programs were very simple and were called text editors or line editors. They were line oriented. The user had various commands to access text one line at a time and other commands to edit the line. If that sounds primitive and somewhat difficult to handle, it is.

Five to ten years ago, computer memory was expensive, and large, friendly programs were not economical. In addition, most work was done on terminals connected to multitasking mini or mainframe computers with low capacity links. Time sharing, mostly over telephone lines at 110 or 300 Baud was common. Full-screen editing is impossible under these conditions. The bulk of the text editing was programming or setting up an application.

As computing became less expensive, full-screen editing began to appear in word processing systems intended for business applications. Because of the variety of business needs, these word processing systems were powerful, but difficult to learn and use fully.

Richard White lives in Fairfield, Ohio, and has a long background with microcomputers and specializes in BASIC programming. With Don Dollberg, he is the co-author of the TIMS *database management program.*

At this point, we can define three types of word processing applications. First is the full-featured business word processor examplified by the Wang *MultiMate* and *WordStar* systems and software to name a few. Second is the word processor for the professional person such as an engineer, lawyer, college student, teacher or even writer who can most effectively compose text at a keyboard, but does not need many of the features in a business word processor. The last type of word processor is for home and student use.

CoCo Word Processors

Telewriter was the first multi-featured word processor for the CoCo and remains the most used. Its selection of easily used features meets home and professional needs and some small business applications. It is also easy to learn.

When the first ad for *Telewriter* appeared in November 1981, it sounded too good to be true. The three week wait for the package to arrive was one of the longest I have known. Frankly, I would not be writing for RAINBOW were it not for *Telewriter.* My keyboard skills are such that I must edit to get clean copy and I simply cannot get clean copy from a typewriter.

Since then, other text editors and word processors have been offered for the CoCo. The *VIP Writer* under Disk BASIC is somewhat more powerful than *Telewriter*, particularly when it comes to printing a document. It has developed a large group of users. But it is complex and should be used only if the features are needed. On the other end, *Elite Word* provides a user-friendly program with sufficient features to satisfy most home users.

The arrival of OS-9 provided some interesting options including *DynaStar/DynaForm*, *StyloGraph* and *The Last Word.* These are all multifeatured packages competing for the professional and business segments of the market.

I have *DynaStar* and *DynaForm* and use them quite a bit for a number of reasons. First, the type ahead buffer in OS-9 eliminates lost characters when the screen is scrolled. This has always been a problem with *Telewriter* — it does not watch the keyboard as the screen is updated. Secondly, the editing commands duplicate those that *WordStar* and quite a few other text editors like *Sidekick* and *PCWrite* use on MS-DOS machines. Since I use these packages at the office, it helps to use the same commands at home. And finally, I wanted a package that would operate under OS-9.

The *DynaStar/DynaForm* package follows the pattern of a number of other word processors on other machines. The text editor is a separate program from the printer program. This maximizes the text buffer available. To print, the user exits *DynaStar*. This saves the text to a disk file. The user then calls *DynaForm* giving the name of the file to be printed. Control codes placed in the text control both *DynaForm* and the printer. This method permits use of headers, footers, automatic page numbering, margins, text and page lengths, new page control and a variety of other features including mail merge.

Mail merge permits printing customized form letters using variable text from a separate file. I am secretary of our local Tandy user group and one of my jobs is to send the renewal notices. My letter, which may be a bit different each month, contains the proper instructions so *DynaForm* can find the second file and read in the addressee and saluation data. And it keeps printing customized letters until the end of the data file.

Actually, my renewals file needs to do double duty. First it needs to be entered in a form from which mailing labels can be printed. Then it needs to be modified to serve as the variable data file for *DynaForm*. Now entering addresses and printing labels is easily done from most any word processor. If, however, printing is done using *DynaForm*, codes must be in the file to overcome the printing defaults for top and bottom margins since we want printing to start on the top label and continue label by label on the continuous label stock.

I had some trouble overcoming those defaults in *DynaForm*, but it's a piece of cake with *DeskMate*'s text editor and printer. The same is true for *TSEdit* under either OS-9 or Disk BASIC. A file produced by *DeskMate* is readable by both *DynaStar* and *DynaForm*. *DeskMate* only requires that the file have a .DOC extension which it automatically adds and for which it checks before loading a file.

To print a file without margins from *DeskMate*, type `@-*` to call the icon bar, move the square over the printer icon and type ENTER. Set the top margin to zero, the page length to 66 and the length of text to 66 as well.

The *DeskMate* printer is fairly basic. But, nowhere are there rules that say a file produced by *DeskMate* must be printed from *DeskMate*. If you have the complete OS-9 package rather than the limited version supplied with *DeskMate*, you can use most any of the printing programs available for OS-9 including *DynaForm*. This also includes Frank Malaney's *PrintForm* text formatter, for which the source code was published in Dale Puckett's "KISSable OS-9" column in the May 1986 RAINBOW.

> **". . . DeskMate did add the .DOC extension . . . It is little things like this that give one a good feeling about software."**

Following the *WordStar* conventions, both *DynaForm* and *PrintForm* look for formatting commands that start with a period (.) on a new line. Further, both programs expect line lengths to be established by the editing program. Finally, control characters, characters whose ASCII values are less than 32, may be inserted into the text to send predefined control character sequences to the printer.

I know of no way that control characters can be placed in a *DeskMate* file so the printer controls are not available to the *DeskMate* user. What's lost is the the ability to start and stop underline, change type faces and the like. But all the other dot commands that control margins, headers, page numbering, etc. can be entered through *DeskMate*'s text editor.

Defined Line Lengths

We have to do a little slight of byte to get *DeskMate* to produce a file with line lengths defined. That it can be done is a compliment to *DeskMate* and to OS-9. Use `@-*` to call the Icon Bar and go to the printer. Set the left margin to zero, the text formatter handles that, and the line length to whatever you want. Most printers print 80-character lines. If you want eight-character margins left and right, you need to subtract both the margins from 80. This leaves a 64-character line that works well. Next, set text length and page length to 66 since the text formatter is going to handle pagination according to either *DynaForm* defaults or dot commands that you have included in the text file. Last, after printer device a file definition must be substituted for /P.

DeskMate's main menu displays four folders along the right side of the screen. These folders actually define paths to file directories. Folder three contains the path /D0/CMDS meaning the commands directory on Drive 0. I am writing this in *DeskMate* and my folder two specifies the path /D1/RAINBOW. I have set my Printer device to be 2:COL42 which means use the path for folder two and name the file COL42. Now when I print the file from *DeskMate*, line lengths are set at 64 and the text is sent to file COL42 rather than to the printer. Try that on an MS-DOS machine. A word of warning: *DeskMate* saves the last printer device definition to a disk file, so remember to change it back to /P when you are done.

At this point I have loaded the new file COL42.DOC into *DynaStar*. Note that *DeskMate* did add the .DOC extension so the file could have been taken back into *DeskMate*. It is little things like this that give one a good feeling about software.

Editing Features

Let's talk about some editing features needed to make a text editor easy to use. First is word wrap. When the user reaches the end of line, the program should automatically move the first part of the word to the next line and then add the remaining letters. Most editors do this. One of my complaints with *DynaStar* is that word wrap is not the default, but must be set each time the program is booted.

There are two ways to handle the text file. One is to preset a line length and have the program word wrap each time the length is reached and insert a carriage return at the end of each line. *Telewriter* word wraps the line and not the display when the line length is greater than the display width. I generally write in the 51-character screen on *Telewriter* and then reset the line length for printing. *Telewriter* lets you reset the screen to 64 of 85 character display widths so you can preview what your text will look like printed. *DynaStar* works much like *Telewriter.* I use a 64-character screen from *O-Pac* and use a 64-character line.

DeskMate employs the alternate approach. It word wraps the display, but doesn't set line length until printing. This is why we had to do some slight of bytes to get a proper file for *DynaStar* and *DynaForm.*

In all cases, we have been talking about full-screen editors where the cursor can be moved using either arrow key or the *WordStar* diamond keys. I think *DeskMate* is fully as powerful as *DynaStar* and better than *Telewriter* when moving the cursor. It uses arrow keys alone or in conjunction with the SHIFT and CLEAR keys to provide easy control.

DynaStar uses the *WordStar* diamond with the CLEAR key as the control key. For example, the CLEAR must be pressed while one of the following keys is used to move the cursor: 'E'-up one line, 'D'-right one character, 'X'-down one line and 'S'-left one character. For extended moves, hold CLEAR down and press 'F'-right one word, 'C'-down one screen, 'A'-left one word or 'R'-up one screen. Additional keys are 'G'-delete one character right, 'H'-delete one character left (backspace), 'T'-delete word to right and 'Y'-delete line. If you don't run into this convention on the CoCo, you probably will on some other machine.

Telewriter provides right and left character delete with left arrow and CLEAR/left arrow as well as CLEAR/'K' to kill a line. *DeskMate* lets you enter the insert mode with '@'/'I' and use backspace delete with '@'/left arrow. In addition, *DeskMate* provides a select-delete combination that may provide the best control yet. Pressing '@'/'6' puts *DeskMate* into the select mode and the arrow keys can be used to highlight selected text. Use the right arrows to select characters on a line, the up or down arrows to select lines of text, SHIFT/up and down arrows to select screen of text or CLEAR/up and down arrows to select to beginning or end of file.

Once text is selected, it may be copied with '@'/'3' or deleted with '@'/'5'. Copy puts a copy of the text into a buffer. Text may subsequently be inserted by moving the cursor to the insertion point and pressing '@'/'4'. To make a move, you must make a copy, an insertion and then a deletion.

In *Telewriter* and *DynaStar*, the start and end of the text are marked and the cursor is moved to the point of insertion for copying. Both support a delete of marked text. However, *DynaStar* does not remove the markers after an operation unless you kill the text so you can make as many copies as you want without remarking text. Finally, *DynaStar* supports a move operation.

Long Text Files

How are long files handled? All the programs described have a buffer to hold text in memory. Generally, buffer size limits the size of the individual text file you can work with. My *Telewriter* can hold nearly 25K of text. A typical RAINBOW column usually runs 15K to 20K. If you are writing a book, make a separate file for each chapter and you shouldn't have any trouble.

Our TIMS documentation filled three files. *Telewriter* supports a chain printing feature that allows a command at the end of one file to call the next file and to continue printing with full paging and page numbering. So, we were able to print out the total documentation in camera ready form. The subsequent printings were typeset and pasted up so multiple disk files presented no problems. By the way, the files were sent by modem to the typesetting company and fed directly to the typesetter.

> **"Buffer size limits the size of the text file you can work with."**

This column goes to RAINBOW on a disk and is loaded directly to the typesetter for editing and then is typeset. Articles submitted with a tape or disk file along with a double-spaced, printed copy are more favorably received than those without. Each RAINBOW has general information on submitting material and on how to get more detailed information.

Some word processors keep some or most of the text on a disk file during document preparation. *DynaStar* opens a scratch file at the beginning of the editing session. If the buffer fills, the user returns to the main menu and requests more space. Then all text before the paragraph containing the cursor is saved to the scratch file. At the end of the session the rest of the text is saved to the scratch file, which is closed and renamed to the filename selected. To edit that file, it is opened along with a new scratch file and enough text is loaded to fill about 80 percent of the buffer. This allows you to add new text. When more text is requested, the beginning of the document is saved to the new scratch file and more text is loaded from the old file. When the session is ended, all text in the buffer and in the old file is transferred to the scratch file. The old file is deleted and the scratch file is renamed.

As a practical matter, file size is limited to half the available storage space on the drive holding the data directory. Many people replace the drivers supplied with OS-9 and run 40-track, 80-track, double-sided or hard-disk formats. Obviously, there is no real limit in file size if the necessary hardware and drivers are used. Couple this with the ability to chain print files in *DynaForm* and you could print all the text from all RAINBOWs to date in one printing session.

In Conclusion

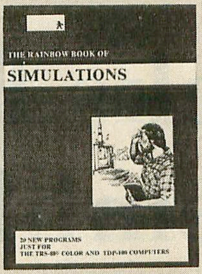
I have made no attempt here to provide a definitive study of word processing. Rather I have rambled on from my experience with a variety of programs. I like *DeskMate* and use it in spite of having *Telewriter*, *TSEdit*, and *DynaStar.* It does not do all I need to do, but I can always move the file into *DynaStar* to finish up.

There are certain things all word processors must do to get words into the file and changes made. I consider *DeskMate* a low-cost implementation partly because of the other applications that come with the text editor. Still its performance is suprisingly good. I even like the 32-character screen; it is easier on my old eyes. And it is highly consistent with *Text* on the Model 100s and 200s and *DeskMate* on the Tandy MS-DOS machines and better in some respects. If you need more and have OS-9, *DynaStar*/*DynaForm* do the job well and advertisments make *The Last Word* sound good. Under Disk BASIC, *Telewriter* cannot be beaten. *TSEdit* is the most limited, having no text formatting capabilities. Still, at $34.95, you get both Disk BASIC and OS-9 versions that feature a variety of high resolution screens. I still load it up on occasion.

Recommended Reading for Your CoCo from . . .

The Rainbow Bookshelf

THE COMPLETE RAINBOW GUIDE TO
OS-9
By Dale L. Puckett and Peter Dibble


THE RAINBOW BOOK OF
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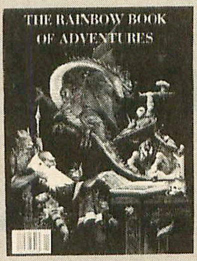

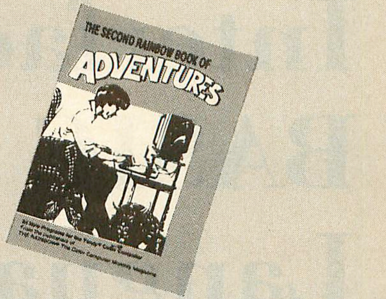

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ECB

BARDEN'S BUFFER

Interfacing Tricks for BASIC and Assembly Language

By William Barden Jr.
Rainbow Contributing Editor

One of the best ways to learn assembly language is to write short assembly language programs and use them in conjunction with BASIC programs. This is called interfacing assembly language to BASIC. One reason for doing this is that the short assembly language programs can speed up BASIC programs dramatically.

Need a fast sort of records in a disk file? Read in the records using BASIC and then go to an assembly language sort to put them in alphabetical order. Need a fast way to scroll data on the screen? Use an assembly language screen scroll program called by the main BASIC program. Combining assembly language with BASIC allows you to have the speed of assembly language with the text and formatting capability of BASIC, so you get the best of both worlds.

In this column we'll show you how to go about interfacing simple assembly language programs to BASIC so you can try your hand at combining them. We'll keep it at a beginner's level, for the most part. Among the examples are an assembly language program that counts the number of words on the screen and an assembly language program that "explodes" screen text.

Bill Barden has written 27 books and over 100 magazine articles on various computer topics. His 20 years experience in the industry covers a wide background: programming, systems analyzing and managing projects ranging from mainframes to microcomputers.

Assembly vs. Machine Language

The terms machine language and assembly language are often confusing so before starting, we should straighten out exactly what is meant by the two terms.

There's only one language the 6809 microprocessor in the Color Computer understands and that's machine language. The 6809 has a built-in set of instructions to do simple things like adding two numbers, transferring a byte from memory to a register in the 6809 or the other way around and branching to a memory location (like a `GOTO` in BASIC). These instructions are decoded by the microprocessor from the ones and zeroes it reads in memory as it executes a machine language program. Each instruction is held in one, two, three or four bytes of memory, and are generally arranged in a long sequence of instructions that the 6809 accesses one after another. A branch can alter the order of the instruction sequence just like a `GOTO` or `IF` statement can alter the sequence in BASIC. A typical sequence of machine language numeric values is shown in Figure 1, along with the instructions represented.

The built-in instruction set is generally not used by writing down long lists of binary (or hexadecimal) values. Instead, a programmer writes down a mnemonic (memory jogging) abbreviation for the instruction, such as ADD for the machine language code of 187 (add two numbers) instruction and SUB for the machine language code of 176 (subtract two numbers) instruction. These mnemonics are used even if the programmer is hand assembling the code, simply because it's easier to write instruction names rather than numbers. In the simplest form, the mnemonic names and the operands associated with the instructions are a form of assembly language.

An assembler program is a computer program that translates mnemonic names and operands into the numeric machine language values the 6809 understands. When an assembler program is used, the assembly language may contain more bells and whistles than the hand written mnemonics written by a programmer, but it's basically the same idea. Listing 1 shows the assembly language version of the machine language code of Figure 1.

Listing 1: Assembly Language Coding

```
BNE    TSTEND    GO IF NOT LINE START
INC    WC,PCR    NEW LINE IN WORD CASE
LDY    #0        RESET "IN WORD"
```

Assemblers

The assembler we've been using in this column is the Color Disk *EDTASM* assembler (or the *EDTASM+* version for cassette). It's easy to use, inexpensive and contains enough features to make even experienced programmers happy. We can't provide a tutorial on using *EDTASM* here, but if you refer to the manual, it's not too difficult to get to the point where you can assemble a short program. In the approach we're using this month, you don't have to do much more than just get a screen listing of the program — you won't have to worry about saving the program and reloading it.

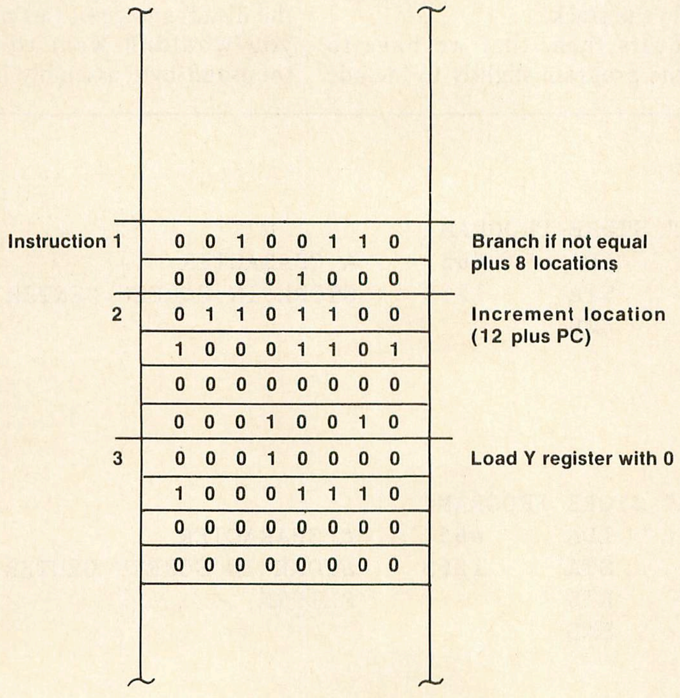

Figure 1: Assembly Language Coding

A Simple Program

The simplest program I can think of that does anything useful is a program to write the letter 'A' on the text screen. The text screen uses memory locations from 1024 decimal through 1535 to store its 16 lines of 32 characters each, a total of 512 characters. Assembly language programmers use hexadecimal notation a lot, because so many things in a computer are done in powers of 16. The "hex" equivalent of 1024 is $400, where the '$' stands for hexadecimal to follow. We'll use both decimal and hexadecimal values in the following examples to make life easier for those who don't understand hex notation.

The problem is to write the ASCII code of 65 decimal ($41), representing an 'A' to the screen. Let's shoot for the screen center at line 8 (counting lines from 0) and character position 15 (again counting from 0). The memory location is at location (1024 + 7*32 + 15) or 1263 ($4EF).

The program to do this is shown in Listing 2. It first loads the A register in the 6809 with a code of 65, then stores the contents of A to location 1263. The A register in the 6809 is a special high-speed memory location within the 6809 and not in user memory. It's used to store temporary results and as a working 6809 memory location for processing data. The 6809 has another register called B which is used for the same purpose.

Why two registers? Ideally, a microprocessor would have dozens of registers such as these so all kinds of values could be held temporarily, but the two accumulators of the 6809 represent a compromise of price and integrated circuit technology. The LDA and STA are two mnemonics for the instructions involved. The 65 and 1263 are the operands for each of the instructions.

Listing 2 is a complete program. It stores an 'A' in the screen center. But, how can we use it? One way would be to assemble the program with a CoCo assembler such as *EDTASM*, store the resulting machine code in a machine code file on disk or cassette (called an object file) and then load it in and execute it by a system `LOADM` and `EXEC` command. The `LOADM` loads in the machine language bytes to memory. The `EXEC` transfers control to the machine language instructions and the 6809 then executes them one by one.

Typically, the program would be located in an area of memory protected from BASIC, such as $3E00 (decimal 15872, just under the 16K byte area). The two instructions would be at $3E00/1 and $3E02/3/4 in this case.

If this program were executed, you would indeed see an 'A' appear in the screen center, superimposed on whatever other characters were on the screen before the program executed (the screen is not cleared by the program or by the action of executing the program). But what happens next?

After the STA 1263 is executed at locations $3E02/3/4, the 6809 attempts to execute the next machine language instruction, starting at location $3E05. However, this location was never filled with an instruction, and just about anything could be in the memory location at that point. In programming terms, this is garbage. As a result, the 6809 tries to execute whatever it finds, which, at best, would be a meaningless set of random instructions. At this point you lose control and the system locks up, looping with meaningless instructions. (At worst, it might jump to the middle of a ROM program, which could clobber disk files or do some other system shenanigans, but that's not too likely.)

Simple BASIC and Assembly Language Interfacing

What we'd really like to do is to store that 'A' from a controlled environment, like BASIC, and then come back to BASIC after the action. Is there a way to do it? I'm glad you asked . . .

BASIC has "hooks" in it to transfer control to an assembly language program (really the machine language instructions of that assembly language program, but we'll call it assembly *language* here) and to get back from the assembly language. One hook is the DEFUSR statement. The other is the USR statement.

The DEFUSR statement tells BASIC where the assembly language is. Suppose that we had the two-instruction program at locations $3E00 through $3E04. We could tell BASIC where the assembly language program was by using `100 DEFUSR0 = &H3E00` or `100 DEFUSR0 = 15872`.

Whenever we wanted to store the 'A' in the center of the screen, we could tell BASIC to transfer control to those instructions by the USR statement, which in essence says "transfer control to the assembly language program at the location defined by the DEFUSR statement." In this case we'd have `1000 A = USR0(0)`.

When Line 1000 is encountered by the BASIC interpreter, a transfer to location $3E00 is made and the program executes, storing the 'A' on the screen.

Returning from Assembly Language

How do we get back to BASIC? After all, normally we'd want to jump out to execute a short piece of assembly language code and then come back to BASIC to execute more BASIC instructions. The way this is done is with a 6809 instruction called RTS, Return From Subroutine. RTS is identical in function to BASIC's RETURN. It causes a return to the instruction following the one that caused the transfer.

RTS is a normal 6809 instruction used as the last instruction in all 6809 subroutines. It just happens to be a convenient instruction to use as a return to BASIC. When the 6809 executes the RTS, it goes to a special area in memory called the stack. It gets the first two data bytes from the stack and uses them as a return address. The return address in this case represents an address in the BASIC interpreter code just after the code that caused the transfer to take place. As a matter of fact, the instruction executed to cause the transfer is a JSR-type instruction (Jump to Subroutine) which branches to the assembly language code and stores the return address in the stack.

It appears then, that we have to modify the program slightly to include an RTS instruction to get back to BASIC. Listing 3 shows the new code.

How Does the Code Get There?

Before we can execute the instructions, however, we must first guarantee the code is in memory. One way is to load the code by LOADM (or CLOADM), using the object file generated by an assembler such as *EDTASM*. Another way — the one we'll be using here — is to actually store it in memory from values in BASIC data statements. Incorporating the code in BASIC data statements means that machine language code can be included in BASIC programs, making the entire process a simple one-step process.

Let's assume we're using the $3E00 area as before. This BASIC code:

```
130 FOR I = &H3E00 to &H3E05
140 READ A: POKE I,A
150 NEXT I
160 DATA &H86,&H41,&HB7,&H04,&HEF,&H39
```

moves the machine language values from the DATA statements into the $3E00 area just as if the data was loaded from a LOADM (CLOADM) file. Of course, the disadvantage of this method is that you wouldn't want to try it for a thousand-byte assembly language pro-

Listing 2: Write an 'A' Program

```
                        00100 * "A" STORE PROGRAM
  0000 86    41         00110         LDA     #65      A CHARACTER
  0002 B7    04EF       00120         STA     1263     STORE IN SCREEN CENTER
             0000       00130         END

  00000 TOTAL ERRORS
```

Listing 3: Write an 'A' Program Corrected

```
                        00100 * "A" STORE PROGRAM
  0000 86    41         00110         LDA     #65      A CHARACTER
  0002 B7    04EF       00120         STA     1263     STORE IN SCREEN CENTER
  0005 39               00130         RTS              RETURN
             0000       00140         END

  00000 TOTAL ERRORS
```

Listing 4: WORDCNT1

```
                        00100 * WORD COUNT PROGRAM
  0000 8E    0400       00110         LDX     #$400    PNTR TO SCREEN
  0003 108E  0000       00120         LDY     #0       "IN WORD" FLAG
  0007 6F    8D 0036    00130         CLR     WC,PCR   ZERO WORD COUNT
                        00140 * MAIN LOOP HERE
  000B A6    80         00150 LOOP    LDA     ,X+        GET NEXT CHARACTER
  000D 81    60         00160         CMPA    #96        IS IT BLANK?
  000F 26    10         00170         BNE     NOTBLK     GO IF NOT BLANK
                        00180 * BLANK HERE
```

gram. But for short programs, it works fine. The &H indicates hexadecimal values to BASIC. The hex values are taken directly from the program listing.

Once the code is stored in the $3E00 area, we're ready to execute . . . almost.

Protecting Memory

Actually, there's one important thing we should have done before storing the data — protect the memory area where the code is to be stored. BASIC uses a number of areas in high and low memory, as shown in Figure 2. Variables and arrays are stored as required, working up towards higher memory. Strings and the stack area (the same stack we've been talking about) are stored in high memory, with the stack working down. If the area in which we're going to store the data is not protected, storage of stack or string data results in valid instruction data being clobbered. What's to be done?

The `CLEAR` statement in BASIC is specifically used for this protection feature, along with setting the size of the string storage area. To protect the $3E00 area and provide 1,000 bytes of string storage (usually enough, depend-

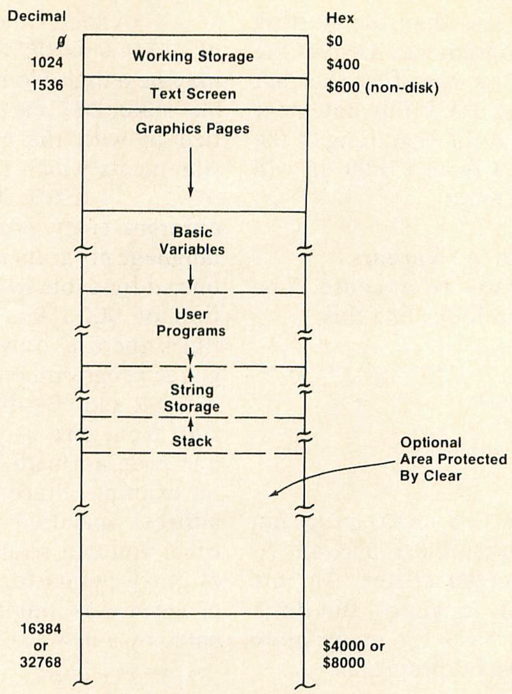

Figure 2: BASIC Memory

```
0011 108C 0001     00190          CMPY    #1        ARE WE IN WORD?
0015 26   1C       00200          BNE     TSTEND    GO IF NO
0017 6C   8D 0026  00210          INC     WC,PCR    YES - BUMP WORD COUNT
001B 108E 0000     00220          LDY     #0        RESET "IN WORD"
001F 20   12       00230          BRA     TSTEND    TEST FOR END
                   00240 * NOT BLANK HERE
0021 108E 0001     00250 NOTBLK   LDY     #1        SET "IN WRD"
0025 1F   20       00260          TFR     Y,D       PNTR TO D
0027 C4   1F       00270          ANDB    #$1F      TEST FOR LINE START
0029 26   08       00280          BNE     TSTEND    GO IF NOT LINE START
002B 6C   8D 0012  00290          INC     WC,PCR    NEW LINE IN WORD CASE
002F 108E 0000     00300          LDY     #0        RESET "IN WORD"
                   00310 * TEST FOR SCREEN END
0033 8C   0600     00320 TSTEND   CMPX    #$600     AT END?
0036 26   D3       00330          BNE     LOOP      LOOP IF NO
                   00340 * SCREEN END HERE
0038 E6   8D 0005  00350          LDB     WC,PCR  WORD COUNT TO B
003C 4F            00360          CLRA            NOW IN A,B
003D BD   B4F4     00370          JSR     $B4F4   CONVERT TO INTEGER
0040 39            00380          RTS             RETURN
0041      00       00390 WC       FCB     0       WORD COUNT 0 TO 255
          0000     00400          END

00000 TOTAL ERRORS
```

Listing 5: `WORDCNT2`

```
100 'WORD COUNT PROGRAM
110 CLEAR 1000,&H3DFF
```

ing upon the program), you'd do `110 CLEAR 1000, &H3DFF`.

Note that one less than the starting address of the program was used, as the protection address specifies the last location BASIC can use. If this statement is executed once at the beginning of the program, the area from $3E00 up will never be used by BASIC.

At Long Last, An 'A' Appears

We're now ready to execute. The complete program looks like this:

```
100 ' AL DEMO PROGRAM
110 CLEAR 1000, &H3DFF      'protect $3E00 area and up
120 CLS
130 FOR I - &H3E00 to &H3E05
140 READ A: POKE I,A
150 NEXT I
160 DATA &H86,&H41,&HB7,&H04,&HEF,&H39
170 DEFUSR0 - &H3E00
180 A - USR0(0)
190 GOTO 190
```

If you execute this BASIC program, you'll see the screen clear and an 'A' appear in the screen center. Ah, the magic of assembly language. But don't scoff, this is the basis for many more impressive and useful programs.

Color BASIC Gotchas

This sequence of steps is geared to Extended Color BASIC. The sequence for Color BASIC is essentially the same, but there are some differences. Color BASIC does not have a `DEFUSR`, and the address of the assembly language location must be `POKE`d into locations 275 and 276 decimal. For $3E00, for example, this would be `140 POKE 275,62: POKE 276,0 :REM 62*256+0 = 15872.`

Color BASIC also uses just a `USR` statement and not a `USR0` (or `USRn`) statement to make the transfer: `150 A = USR(0)`.

More about the DEFUSR and USRn Statements

In Extended Color BASIC, the format of `DEFUSR` is `DEFUSRn`, where the 'n' may be a digit from zero through nine. `DEFUSR0`, `DEFUSR1`, . . . `DEFUSR9` are tied in with the corresponding `USRn` statements which take the form `USR0`, `USR1`, . . . `USR9`. This means that 10 different entry points in an assembly language program may be defined, each one addressable by a different combination of `DEFUSRn`s and `USRn`s. Many times there is only one assembly language program involved, however. The `DEFUSR` and `USR` digit does not have to start from zero — you could have only one program with `DEFUSR5` and `USR5`, for example. Since you can redefine the address specified by `DEFUSR` at any time, you can really have any number of entry points for assembly language programs, as long as you precede each entry by a new `DEFUSR`.

```
100 DEFUSR5 - &H3E00          'first entry point
.
.
2000 A - USR5(0)              'go to AL code at $3E00
.
.
3000 DEFUSR5 - &H3E10         'new entry point
.
.
4000 A - USR5(0)              'go to $3E10
```

The same thing applies to Color BASIC — `POKE`ing new values at 275/276 sets up a new entry point as many times as you'd like.

Dummy Variables

We've been using a value of zero within parentheses for the `USRn`. This value is a dummy value that satisfies the syntax (format) of the `USRn` statement. The variable 'A' on the left of the equals sign in `A = USRn(0)` is also a dummy. Use any variable you'd like for this. A little later on we'll see how these variables are used in passing data to and from the assembly language subroutine.

How Big Can the AL Subroutine Be?

In the preceding, we've used a three-instruction program to put an 'A' on the screen. In fact, we could make the assembly language subroutine as large as we want, anywhere from one instruction (just an RTS) to thousands of instructions. A final RTS returns to BASIC, however. (We say final because there may be any number of subroutines within the assembly language code, just as there are nested `GOSUB`s/`RETURN`s in BASIC.) Typically though, useful assembly language code is on the order of dozens of instructions. Some of the things that may be coded in dozens of lines of assembly language are screen text processing such as word wrap, sorts of data into alphabetical order, sound subroutines to make noises and music, high-speed animation and fast disk file processing.

Again, the idea is to find the parts of a BASIC program that really bog down in speed and break out these parts in assembly language code. Also, there are functions that are just not possible in anything other than assembly language because it's fast enough to handle real-world events such as sound generation and data communications (serial port) applications.

```
120 CLS
130 FOR I=&H3E00 TO &H3E41
140 READ A: POKE I,A
150 NEXT I
160 PRINT "THEY CAN HAVE MY"
170 PRINT "COCO WHEN THEY PRY"
180 PRINT "MY COLD, DEAD"
190 PRINT "FINGERS FROM IT."
200 PRINT
210 PRINT "IN THIS SECTION"
220 PRINT "YOU'RE GOING TO"
230 PRINT "LEARN HOW TO"
240 PRINT "PROGRAM. DON'T"
250 PRINT "WORRY, IT'LL BE"
260 PRINT "PAINLESS!"
270 PRINT "(FROM A RADIO SHACK"
280 PRINT "MANUAL)"
290 PRINT
300 PRINT "    THE COCO LIVES!"
310 DATA &H8E,&H04,&H00,&H10
320 DATA &H8E,&H00,&H00,&H6F
330 DATA &H8D,&H00,&H36,&HA6
340 DATA &H80,&H81,&H60,&H26
350 DATA &H10,&H10,&H8C,&H00
360 DATA &H01,&H26,&H1C,&H6C
370 DATA &H8D,&H00,&H26,&H10
380 DATA &H8E,&H00,&H00,&H20
390 DATA &H12,&H10,&H8E,&H00
400 DATA &H01,&H1F
410 DATA &H20,&HC4,&H1F,&H26
420 DATA &H08,&H6C,&H8D,&H00
430 DATA &H12,&H10,&H8E,&H00
440 DATA &H00,&H8C,&H06,&H00
450 DATA &H26,&HD3,&HE6,&H8D
460 DATA &H00,&H05,&H4F,&HBD
470 DATA &HB4,&HF4,&H39,&H00
480 DEFUSR0=&H3E00
490 A=USR0(0)
500 PRINT @ 480,"WORD COUNT=";A;
510 GOTO 510
```

Passing an Argument Back from an Assembly Language Subroutine

How about another example of an assembly language program? This time we'll make it a little more useful. Let's try a program that counts the words on the screen. The hard part is coming up with the program in the first place. We'll use this following logic. A word is any text (including numbers and special characters) bracketed by spaces, line start, or a line end. In the line `DISK EXTENDED COLOR BASIC 007` there are five words. More than one space may be present between words, as in `UNDER  LICENSE TO KILL`. In this line there are four words.

The program for counting words is shown in Listing 4. It reads characters from text screen memory, locations 1024 through 1535, looking for space characters (96). Each time two space characters are found, a word count is incremented (one is added to the word count).

The BASIC language program with embedded assembly language code is shown in Listing 5. It looks pretty much like the first example, but there are 23 instructions in 66 bytes instead of three instructions in six bytes, as shown in the listing. This means that 66 values must be stored in the protected memory area. Also, the 'A' variable is used to receive the word count. Try this program from within any BASIC program — we've included a little driver program in BASIC to generate sample text on the screen for the count.

The operation of the program is described in the listing and we won't go into the details here. However, there is one "gotcha" that should be explained. In order to pass back the word count, a ROM subroutine must be used. The subroutine is located at $B4F4 in the Color BASIC interpreter. This subroutine takes a value in the D register and converts it into a BASIC variable. The variable is then set equal to the dummy variable used in the `USR` call, in this case 'A'. The call to $B4F4 is one way of passing back an argument computed in an assembly language subroutine to BASIC. We'll look at some other ways in the next column.

Passing an Argument to an Assembly Language Subroutine

As you might suspect, if you can pass an argument back from an assembly language subroutine, you can also pass an argument to an assembly language subroutine. As an example, look at Listing 6. It shows a short program to cause the letters `EXPLODE` to explode on the screen, flying apart as shown in Figure 3. The speed at which this is done is controlled by passing a value to the assembly language subroutine from BASIC — the smaller the value, the faster the explosion takes place.

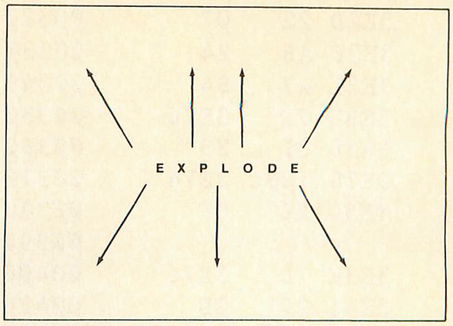

Figure 3: Screen Explosion

The BASIC version of this program is shown in Listing 7. Like the other two programs, it has the machine language bytes in `DATA` values which are moved to the $3E00 area. The explosion speed is input from BASIC and then used in the argument of the `USR0` call.

Within the assembly language code, the first action that must be taken is to call another ROM subroutine in Extended BASIC at $B3ED. This ROM subroutine converts the BASIC variable to an integer value from zero to 65,535 in the D register, which is then used to control the speed of the explosion.

Again, this subroutine is one way to pass an argument to an assembly language program from BASIC, but not the only way. We'll look at alternative approaches next month. In the meantime, try your hand at embedding short assembly language code in BASIC. A few samples will help in your understanding of the process. □

Listing 6: `EXPLODE1`

```
3E00              00100            ORG      $3E00
                  00110 * EXPLODING SCREEN
3E00 BD   B3ED    00120 ENTER      JSR      $B3ED   CONVERT DELAY TO INTEGER
3E03 FD   3E74    00130            STD      DELAY   STORE
3E06 108E 3E51    00140            LDY      #START  SET TO TABLE START
                  00150 * OUTER LOOP SCANS TABLE
3E0A 7F   3E76    00160 LOOP1      CLR      DONE        RESET ACTIVITY FLAG
                  00170 * INNER LOOP HANDLES EACH CHAR
3E0D AE   A4      00175 LOOP2      LDX      ,Y               GET CURRENT CHARACTER
3E0F 8C   0400    00180            CMPX     #$400            TEST FOR OFF SCREEN
3E12 2D   22      00190            BLT      OUT              GO IF OFF (UP)
3E14 8C   05FF    00200            CMPX     #$5FF            TEST FOR OFF SCREEN
3E17 22   1D      00210            BHI      OUT              GO IF OFF (DOWN)
3E19 86   60      00230            LDA      #96              BLANK CODE
3E1B A7   84      00240            STA      ,X               STORE BLANK
3E1D EC   A4      00250            LDD      ,Y               GET LOCATION
3E1F E3   22      00260            ADDD     +2,Y             ADD DISPLACEMENT
3E21 ED   A4      00270            STD      ,Y               STORE NEW LOC'N
3E23 1F   01      00280            TFR      D,X              IN X FOR INDEXING
3E25 8C   0400    00290            CMPX     #$400            TEST FOR OFF SCREEN
3E28 2D   0C      00300            BLT      OUT              GO IF OFF (UP)
```

```
3E2A 8C      05FF     00310          CMPX    #$5FF      TEST FOR OFF SCREEN
3E2D 22      07       00320          BHI     OUT        GO IF OFF (DOWN)
3E2F A6      24       00330          LDA     +4,Y       GET CHARACTER
3E31 A7      84       00340          STA     ,X         STORE NEW CHARACTER
3E33 7C      3E76     00350          INC     DONE       SET ACTIVITY
3E36 31      25       00360 OUT      LEAY    +5,Y       BUMP TABLE PNTR
3E38 108C    3E74     00370          CMPY    #TEND      TEST FOR END OF TABLE
3E3C 26      CF       00380          BNE     LOOP2      GO IF NOT
                      00390 * END OF ONE PASS HERE
3E3E 7D      3E76     00400          TST     DONE     TEST FOR ACTIVITY
3E41 27      0D       00410          BEQ     ENDRET   GO IF NO ACTIVITY
3E43 108E    3E51     00420          LDY     #START   RESET TO TABLE START
3E47 BE      3E74     00430          LDX     DELAY    USER DELAY
3E4A 30      1F       00440 LOOP3    LEAX    -1,X     DELAY
3E4C 26      FC       00450          BNE     LOOP3    FOR USER COUNT
3E4E 20      BA       00460          BRA     LOOP1    CONTINUE
3E50 39               00470 ENDRET   RTS            RETURN HERE
                      00480 * EXPLODE AT LINE 8, CP 12
3E51         050C     00490 START    FDB     $50C   E LOCATION
3E53         FFDF     00500          FDB     -33    E DISPLACMENT
3E55         45       00510          FCC     'E'
3E56         050D     00520          FDB     $50D   X LOCATION
3E58         001F     00530          FDB     31     X DISPLACEMENT
3E5A         58       00540          FCC     'X'
3E5B         050E     00550          FDB     $50E   P LOCATION
3E5D         FFE0     00560          FDB     -32    P DISPLACEMENT
3E5F         50       00570          FCC     'P'
3E60         050F     00580          FDB     $50F   L LOCATION
3E62         0020     00590          FDB     32     L DISPLACEMENT
3E64         4C       00600          FCC     'L'
3E65         0510     00610          FDB     $510   O LOCATION
3E67         FFE0     00620          FDB     -32    O DISPLACEMENT
3E69         4F       00630          FCC     'O'
3E6A         0511     00640          FDB     $511   D LOCATION
3E6C         0021     00650          FDB     33     D DISPLACEMNT
3E6E         44       00660          FCC     'D'
3E6F         0512     00670          FDB     $512   E LOCATION
3E71         FFE1     00680          FDB     -31    E DISPLACEMENT
3E73         45       00690          FCC     'E'
             3E74     00700 TEND     EQU     *
3E74         0000     00710 DELAY    FDB     0      USER DELAY COUNT
3E76         00       00720 DONE     FCB     0      ACTIVITY FLAG
             0000     00730          END
00000 TOTAL ERRORS
```

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Listing 7: EXPLODE2

```
100 ' EXPLODING TEXT PROGRAM
110 CLEAR 1000,&H3DFF
120 CLS
130 PRINT@268,"EXPLODE";
140 FOR I=&H3E00 TO &H3E76
150 READ A: POKE I,A
160 NEXT I
170 DATA &HBD,&HB3,&HED,&HFD
180 DATA &H3E,&H74,&H10,&H8E
190 DATA &H3E,&H51,&H7F,&H3E
200 DATA &H76,&HAE,&HA4
210 DATA &H8C,&H04,&H00,&H2D
220 DATA &H22,&H8C,&H05,&HFF
230 DATA &H22,&H1D,&H86,&H60
240 DATA &HA7
250 DATA &H84,&HEC,&HA4,&HE3
260 DATA &H22,&HED,&HA4,&H1F
270 DATA &H01,&H8C
280 DATA &H04,&H00,&H2D,&H0C
290 DATA &H8C,&H05,&HFF,&H22
300 DATA &H07,&HA6,&H24,&HA7
310 DATA &H84,&H7C
320 DATA &H3E,&H76,&H31,&H25
330 DATA &H10,&H8C,&H3E,&H74
340 DATA &H26,&HCF,&H7D,&H3E
350 DATA &H76,&H27,&H0D,&H10
360 DATA &H8E,&H3E,&H51,&HBE
370 DATA &H3E,&H74,&H30,&H1F
380 DATA &H26,&HFC,&H20,&HBA
390 DATA &H39,&H05
400 DATA &H0C,&HFF,&HDF,&H45
410 DATA &H05,&H0D,&H00,&H1F
420 DATA &H58,&H05,&H0E,&HFF
430 DATA &HE0,&H50,&H05,&H0F
440 DATA &H00,&H20,&H4C,&H05
450 DATA &H10,&HFF,&HE0,&H4F
460 DATA &H05,&H11,&H00,&H21
470 DATA &H44,&H05,&H12,&HFF
480 DATA &HE1,&H45
490 DATA &H00,&H00,&H00
500 DEFUSR=&H3E00
510 A=USR0(15000)
520 GOTO 520
```

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Choices: The Reason for Modularity

By Dale L. Puckett
Rainbow Contributing Editor

Life behind the keyboard of a Color Computer was once simple. In the early years (circa 1979) there was little software to pick from and third-party hardware did not exist. Today, it's a different story. There are enough programs to make your head spin. And on the hardware side, there are more disk controllers on the market than you can count on the fingers of one hand.

Even though there are many choices today, you still have only 64K of memory to work with in the Color Computer. How do you manage hardware and software resources while dealing with this memory constraint? This month we'll look at various strategies and show how OS-9 and its modular design can help make the job easier. We'll also present a smorgasbord of information about current trends in the OS-9 world and pass along several short programs we hope you will find interesting.

Dale L. Puckett, who is author of The Official BASIC09 Tour Guide *and co-author, with Peter Dibble, of* The Official Rainbow Guide to OS-9, *is a free-lance writer and programmer. He serves as director-at-large of the OS-9 Users Group and is a member of the Computer Press Association. Dale works as a U.S. Coast Guard chief warrant officer and lives in Alexandria, Virginia.*

Device Descriptors and Drivers Revisited

When we first began writing this column several years ago, we talked about the modular design of OS-9. With the release of Version 2.00.00 on the Color Computer, the importance of this design is obvious to anyone with more than a passing interest. Let's review.

OS-9 lets you add new hardware to the computer by adding two new software modules — a device descriptor and a device driver. First, plug in the new hardware device. Then load the device descriptor and device driver into memory. As soon as the two modules are loaded you can communicate with the new hardware by redirecting the standard input and output paths to the new device descriptor.

For example, as soon as you plug in the new 15-megabyte hard disk drive from Tandy, the OS-9 commands following will put you on the air. The modules directory is located on the Boot/Config disk that comes with OS-9 Version 2.00.00.

```
OS9: load /dl/modules/cchdisk.dr <ENTER>
OS9: load /dl/modules/h0_15.dd <ENTER>
OS9: chx /h0/cmds <ENTER>
OS9: chd /h0 <ENTER>
```

The file cchdisk.dr is the device driver. It contains a short piece of 6809 code that knows how to talk to the hard disk controller in the Tandy drive. Since OS-9 device drivers are reentrant, more than one device may use them at the same time. For example, you could plug in two of the Tandy hard disk drives and load in two device descriptors, /h0 and /h1. Yet, you would need only one copy of cchdisk.

More About Device Descriptors

OS-9 device drivers are generic. This means they can talk to any piece of hardware that uses the same chip. For example, the Aciapak driver that comes with OS-9 can communicate with any piece of hardware that uses the 6551 chip. That's why it works with Tandy's deluxe RS-232 Pak and with PBJ's 2-SP Pak. Further, it can be used to send and receive characters from a terminal, a modem, a printer or any other 6551 hardware.

To send a file to a modem connected to one of Tandy's Deluxe RS-232 Packs plugged into the CoCo, simply redirect the standard output to a device descriptor that uses the Aciapak driver, /T2.

The device descriptor does what its name implies, it describes the physical characteristics of your hardware. The device descriptor gives the device a name, defines its address or location in memory and names the device driver which will use it. It also tells that device driver which file manager will be sending data to the device.

In reality, a device descriptor is merely a table stored in an OS-9 module which can be loaded in memory. An initialization table in each device descriptor defines a set of characters or parameters to tell the device driver what the device looks like at startup. For example, the device descriptor used by a terminal often tells the device driver that to backspace the cursor, the terminal must receive the character 8 decimal. OS-9 lets you change these initial parameters with two utility programs, *Tmode* and *XMode*.

At Your Fingertips or On Your Disk

The fact that device descriptors and device drivers can be loaded, used and unloaded freely is extremely important today as we add new hardware to our CoCo and try to make it all work in the same 64K of memory. To manage the transition to more powerful systems, we must understand our options. Thanks to the forethought of OS-9's designers at Microware, we can take one of two approaches. We have a choice.

Most of us react the same at first. Let's put all our device descriptors and device drivers in the OS-9 boot file so they'll be there every time we want to use them. That's not a bad idea — on an OS-9 Level Two system. However, on an OS-9 Level One system, you can run into trouble pretty fast.

For example, not long ago I added a ThunderRAM to my old gray CoCo. I had also just bought a Deluxe RS-232 Pak from a local Radio Shack store. I was already running Version 2.00.00 and liked the idea of having the NIL bit bucket descriptor and its driver ready to accept my garbage at any time. And, how could I do without the sound drivers for my Radio Shack Speech-Sound Pack? No problem, I simply used OS9Gen and made a new boot disk that contained the new descriptors and drivers in the OS-9 boot file.

Immediately after booting the new boot disk, I ran the OS-9 MFree utility just for the fun of it. But I had only 130 pages or just a little more than 30K of memory left to run my application programs. Definitely not satisfactory. For example, the Radio Shack C Compiler from Microware needs about 150 pages of free memory to operate properly with typical source code files. It was time to look for an alternative approach.

OS-9's modularity and ability to load a file containing the driver and descriptor modules, to use the device and then unlink the modules provided the alternative. I would only load the device descriptor and the device driver for the Deluxe RS-232 Pack when I was ready to communicate with another computer or a timesharing service. After I had sent my traffic, I would unload the device descriptor and device driver to save precious memory. I could do this with the descriptor and driver for the Sound-Speech Cartridge, the RAM-Disk and several other pieces of hardware attached to my Color Computer. First, we'll show you several ways to load and use device descriptors and driver. Here's one way:

```
OS9: load /t2
OS9: load /ACIAPAK
OS9: list afile >/t2  ; * or whatever
OS9: unlink t2
OS9: unlink ACIAPAK
```

This approach gets the job done. However, you may be able to avoid a few keystrokes by saving both modules in the same file.

```
OS9: save /d0/cmds/comms /t2 /ACIAPAK
OS9: load comms
OS9: list your_stuff >/t2
OS9: unlink t2
OS9: unlink aciapak
```

A note of caution if you follow this approach. When you run the command line, load comms, OS-9 only links to t2. Aciapak is not linked. It is possible for the driver to become unlinked after it is used and if this happens, you will get an error message the next time you try to use the device. To get around this, a procedure file can be built to take care of everything.

```
OS9: build /d0/comms
? load t2
? load ACIAPAK
? link ACIAPAK
? <ENTER>

OS9: /d0/comms
```

Then, when you want to use the comms port, you need only type `/d0/comms` and OS-9 does the dirty work for you. Of course, you may want to let a procedure file take care of the unlinking too.

```
OS9: build /d0/killcomms
? unlink t2
? unlink ACIAPAK
? <ENTER>
```

After you have built these procedure files a dialog might look something like this:

```
OS9: /d0/comms
OS9: list much_stuff >/t2 ;
     * do your thing
OS9: /d0/killcomms
```

If you had used the filename comms when you built the file instead of /d0/comms, it would have been stored in the current data directory. And, since you probably have many data directories, you would never know where to find it. If you give the procedure file a short name and put it in a specific place, you will always be able to find it. For this reason, /d0/t2 may be a better name than comms. We'll leave that up to you.

> ***"Unlink only attempts to unlink them once."***

If you own one of the public domain unload utilities like the one we published several months ago, use it instead of unlink. Unload keeps unlinking the modules until it is sure they are out of memory. Unlink only attempts to unlink them once. If the link count is higher than one, the module will still be linked after running unlink. You will not have retrieved the memory.

More on CD-I

Last month we mentioned CD-I, the new Compact Disk Interactive Media recently introduced by Sony and Phillips. OS-9 is the brain behind this revolutionary entertainment, education and electronic publishing tool. The system is based on the small compact discs now being sold in record stores nationwide. But, CD-I goes the audio discs two better. It adds natural pictures and interactive capabilities. Information distribution will never be the same. Imagine talking encyclopedias, dictionaries, maps that take you on a talking picture tour of a city, textbook videos, etc.

Because CD-I is interactive, you will be able to quickly locate any information from the 600 megabytes stored on a disc. That's 150,000 printed pages of text to pick from, or about 20 hours of speech-quality sound. The software that drives the CD-I is based on the kernel of OS-9 68K plus a new CD-I file manager.

I asked Dr. James W. "Bill" Moore Jr., the head of Microware's new education and training department, what impact the CD-I explosion might have on CoCo OS-9 users.

> *"Imagine talking encyclopedias, dictionaries, maps that take you on a talking picture tour . . . "*

"Directly, none." Moore said. "The hardware that drives this machine goes beyond the 6809. However, CoCo OS-9 users have the benefit of a general knowledge of OS-9. This gives them an educational edge."

Moore told me the OS-9 software will be buried deep in the machine and the user will never see it. At this point, the machine is actually a stand-alone unit and not a computer peripheral. However he did not deny the possiblity of expanding one of these machines into a full computer.

Microware will be sponsoring a few seminars for OS-9 users around the country sometime in the future and Bill promised to let us know the details and schedule as soon as plans are complete. Moore plans to talk about the impact of CD-I on the CoCo OS-9 user during his keynote address at the OS-9 Community Breakfast during RAINBOWfest Chicago.

FHL Introduces New 68020 Computer

Frank Hogg is really excited about the new CD-I revolution. When he called to tell me about a new computer in the FHL QT line, I asked him how he thought CD-I would affect OS-9. "First, it has built-in hooks to interface with other computers," he said. "This tells me it should work best with an OS-9 based computer."

Hogg feels that Phillips and Sony teaming up with Microware will give OS-9 the stamp of approval it needs to be a tremendous success. "It can be compared to IBM picking MS-DOS," he said. "It says, 'OS-9 is OK.'"

Hogg speculates that the CD-I drive will be out first in 12 to 18 months and later expanded into a full-blown computer. "That will be great," he said. "Because this box will be OS-9."

On the CoCo hardware front, Hogg hopes to someday offer a ready-made hard disk system. If everything works out, a 20-megabyte hard disk and an 80-track floppy disk complete with case and power supply may be available soon from FHL.

Frank had called to talk about QT-20X, the in-house code name for a new FHL computer. The machine has a board with an IBM PC footprint and features a 68020 running at 12.5 megahertz, real time clock, parallel and serial interfaces, DMA on the floppy and hard disk drives and the same SASI interface used in earlier QT computers. The motherboard has seven long and one short expansion slots. Boards already designed feature two megabytes of memory and four serial ports. With seven of these, you could have up to 28 users on line sharing 14 megabytes of memory. Hogg hopes to sell the QT-20X with one of these expansion boards and all the software for less than $2,995.

An OS-9 Bulletin Board

We received a nice letter from Steve Roberson, (The Pubtender) out in Mesa, Arizona. Steve contributed a program called *readdir* to "KISSable OS-9" last year. He also asked if anyone knew of a way he could eavesdrop on his BASIC09 bulletin board program while it was running in the background. I didn't have the answer at the time, but Steve has since solved his problem and has written to share it with us.

"I have completely rewritten the program and it now runs in the main Shell from /term. It accesses the ACIA Pack directly with PEEKs and POKEs, so the device descriptor and device driver for /T2 are no longer needed," Roberson said. "As a result, I can see and control everything going on and a chat mode was quite easy to rig up."

Roberson realizes the disadvantages of this approach. The computer is no longer multiuser. But since a BBS program takes up nearly all the memory and disk space anyway, it wasn't a hard decision for him. He also plugged OS-9's modularity.

"I have taken advantage of BASIC09's modular format to expand the code so

Listing 1: ***cursor fx***

```
******************************
*      CURSOR CONSTANTS      *
******************************
*   CURSOR    VV  XX  YY  ZZ *
*   ------    --  --  --  -- *
* BLOCK       00  B0  47  1C *
* UNDERLINE   07  BB  44  B8 *
* BLINK BLOCK 60  8B  18  06 *
* BLINK UNDER 67  80  1B  A2 *
*                            *
* REPLACE EACH VARIABLE WITH *
* THE PROPER CONSTANT FOR THE*
* CURSOR TYPE OF YOUR CHOICE.*
******************************
t
tmode .1 -pause
load co80.io
debug
l co80
. .+3
=a1
. .+4
=58
. .+14
=VV
. .+26e
=08
. .+3
=0b
=c6
=VV
=20
=02
=c6
=20
=86
=0a
=ed
=d8
=01
=5f
=39
=XX
=YY
=ZZ
q
del -x co80.io
save /d0/cmds/co80.io co80
unlink co80
tmode .1 pause
 -t
```

the source is now about 50K bytes long. The BBS is made up of about 30 small modules which are only in memory when they are needed," Roberson said.

If you would like to see his BBS program in action, give his board, The Pub, a call at 602-899-1350. If you would like to run an OS-9 bulletin board in your community, Roberson will sell you his program, *PBBS 4.0*, for $50. It requires an RS-232 Pack, BASIC09 and OS-9. Steve's address is 1702 West Mountain View Drive, Mesa, Arizona 85201.

Miscellaneous Tips

We have received quite a few letters and several inquiries on RAINBOW's Delphi CoCo SIG about Config, the new utility supplied with OS-9 Version 2.00.00. It seems beginners are having a problem similar to the one they had when BASIC09 was first introduced. Follow these steps and there shouldn't be any problems. Remember, an asterisk in the first character position in an OS-9 command line tells the system that the line is only a comment and is not to be executed. Boot OS-9 normally, then:

```
OS9: load load
OS9: * now remove the OS-9 System disk
OS9: * and put the Boot/Config disk in
OS9: * drive /d0.
OS9: chx /d0/cmds
OS9: chd /d0
OS9: config
OS9: * If you have two drives, answer
OS9: * two at the first Config prompt
OS9: * and insert a blank disk in drive /dl.
OS9: * Later when Config is ready for CMDS
OS9: * you will need to put the OS-9
OS9: * system disk back in drive /d0.
```

I saw a note on the OS-9 SIG from someone who wanted to disable the auto-key repeat in OS-9 Version 2.00.00. He didn't think it was an

Listing 2: ***cursor***

```
***************************************************************
*
* CURSOR  -  COPYRIGHT (c) 1986 by S.B.GOLDBERG
*
* Changes cursor type when used with patched Co80
* For 'WordPak I', 'WordPak II' and 'WordPak-RS'
* WILL NOT WORK WITH UNPATCHED CO80!!!!!
*
* Use: cursor <cursor_code>
* cursor codes:
* 0 = cursor off
* 1 = block cursor
* 2 = underline cursor
* 3 = blinking block
* 4 = blinking underline
*
         ifpl
         use    /d0/defs/os9defs
         endc
*
         mod    len,name,prgrm+objct,reent+1,entry,dsiz
*
code     rmb    1
         rmb    250 stack & param.
dsiz     equ    .
*
name     fcs    /cursor/
         fcc    /(c) 1986 S.B.GOLDBERG/
**************************************
*
* GET AND CHECK PARAMETER
*
entry    ldd   ,x   get parameter
         cmpb  #$20   only one param char?
         bhi   bad   no, exit with param error
         suba  #'0   make binary
         bmi   bad   <0, exit with error
         beq   turnoff   0, turn off cursor
         cmpa  #5   >4?
         blo   save   no, continue
bad      ldb   #56   yes, parameter error
         bra   out   quit with error
save     deca   adjust param. for tables
         sta   code   save adjusted parameter
**************************************
*
* GET ADDRESS OF MODULE IN RAM
*
         leax  modname,pcr   module name (co80)
         clra   any type or language

         os9   f$link   link to get address in U register
         bcs   out  exit with error
         os9   f$unlink   unlink module
**************************************
*
* FIX CURSOR TYPE BYTES
* AND CO80 CRC BYTES
*
         leax  table1,pcr   cursor-type table
         ldb   code   get code number
         lda   b,x   get cursor-type byte
```

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enhancement. That feature, when I use it with the CLEAR/A combination, saves me a lot of keystrokes while working with files. However, it's different strokes for different folks. Try this patch from Bill Dichaus.

```
OffsetWas Change To
 102    27     21
 809    08     36
 80A    C8     BD
 80B    0A     CF
```

The first change makes the patch. The last three locations are the CRC bytes in the file. I prefer to use the OS-9 verify utility command rather than change the CRC manually. Do it this way.

```
OS9: debug
DB: L CCIO
DB: . <SPACE> .+102
DB: =21
DB: q
OS9: save cciotemp ccio
OS9: verify <cciotemp >newccio u
```

Kevin Darling on the OS-9 SIG came up with several patches to Version 2.00.00 of CCIO. To make CCIO auto-lowercase, go to an offset of 35 bytes from the beginning of the module using the debugger and change the next three bytes, E7, C8 and 50, to 12, 12 and 12. Also, if you have an HJL keyboard with the four function keys, you can change the byte at an offset of 036F from 32 to 80 to make the F4 key a case shift toggle. Then you won't need to hold down the CLEAR key and press the zero all the time. Also, Darling says if you use the following command line, the F3 key becomes the pause key.

```
OS9: tmode psc=B1
```

A BASIC09 Graphics Hint

Eric Harrison of Dunnellon, Florida was having trouble displaying graphics with BASIC09. His programs appeared to hang up while going through a loop displaying moving graphics. After much study he found the problem. It seems that BASIC09 sends graphics to the screen the same as it sends text to the screen. This means it pauses after every 16 or so graphics output lines. You must then press a key to make it continue. If you don't, the program appears to be hung up.

The solution is to use the tmode utility to set the -pause flag before sending out the graphics. From within BASIC09 use the following program line:

```
SHELL "TMODE -PAUSE"
```

Of course, at the end of the program, you will want to insert:

```
SHELL "TMODE PAUSE"
```

Making CCIO Longer

Dennis Skala of Fairview, Pennsylvania sent us an interesting note to show how he made a patch to CCIO which made the module longer. You really have to get tricky since CCIO is always in use. I thought you would be interested in Skala's algorithm.

First, use the save utility to make a copy of CCIO on disk. Don't forget if you are using the *O-Pak* Hi-Res screen you must switch back to the Lo-Res screen before saving CCIO. Incidentally, the same holds true for the drivers that come with the Disto Enhanced Display card since CCIO is patched automatically when you switch to the 80-column mode by changing the type byte with tmode.

Now, use debug to rename the copy of CCIO in memory to DCIO by changing the byte at an offset of 0E from 43 to 44. This allows loading the copy of CCIO from the disk.

Load a dummy module in memory to take up at least one page of space. Then load in CCIO and delete the dummy module. This creates some room after CCIO for the additional length.

Use debug to patch the copy of CCIO. Then, use the save utility to save the patched version to a disk file. If you have also patched the CRC bytes, run verify to ensure that you didn't make any mistakes.

Now, you can rename DCIO in memory back to CCIO and make a new boot disk with the new copy of CCIO.

The following patches give HJL keyboard users single-key access to CLEAR/A, CLEAR/W, CLEAR/O and CLEAR/BREAK, the CoCo OS-9 ESCAPE key.

Version 2.00.00 CCIO Patch

```
* After patches:
* F1 = <CLEAR A> (repeat last line)
* F2 = <CLEAR W> (terminal pause)
* F3 = <CLEAR 0> (toggle lower/upper case)
* F4  = <CLEAR BREAK> (escape)

 offsetnew value
   0208 28
 23A10 2C 05 CB
 23E    12 12 12 12 12
 24720 19
 809C1 3710 27 FA 47
 80F34 10 6C C8 67 C0 33
 81630 8D 00 07 E6 85
 81C35 10 16 FA 22
 82101 17 20 32
 8257B 4C 5E    *new CRC
```

If you are more comfortable following assembly code, here is how Skala generated the patches.

```
org 2
fdb $0828

org $023A
lbge patch
nop
nop
nop
nop
nop
cont   equ *

org $0247
bra skip       skip over unneeded code
```

```
         sta   $1d,u   fix initialization byte
         sta   $292,u   fix turn on cursor byte
         leax  table2,pcr   CRC table
         ldb   code   get code number
         lda   #3   adjust for
         mul   cursor type address
         abx   of CRC bytes
         leau  $29e,u   module CRC address
         ldd   ,x++   get first 2 CRC bytes
         std   ,u++   put in module
         lda   ,x   last CRC byte
         sta   ,u   to module
*********************************
*
* SEND CURSOR-ON CODE AND QUIT
*
         leax  curson,pcr   cursor on code
send     ldy   #2   2 bytes
         lda   #1   standard output path
         os9   i$write   turn on new cursor
```

```
         bcs   out   exit with error
         clrb   clear error flag
out      os9   f$exit   quit
*********************************
*
* SEND CURSOR-OFF CODE AND QUIT
*
turnoff  leax  cursoff,pcr   cursor-off code
         bra   send   turn off cursor
*
table1   fcb   $0,$7,$60,$67
table2   fcb   $b0,$47,$1c,$bb,$44,$b8
         fcb   $8b,$18,$06,$80,$1b,$a2
cursoff  fcb   $05,$20
curson   fcb   $05,$21
modname  fcc   /co80 /
*
         emod
len      equ   *
         end
```

```
org $0256
Shiftequ *              back here for shift key

org $0262
skipequ *

org $0809
patchcmpb #$37 shift key?
lbeq shiftyes
pshs x
inc $67,usimulated control key
subb  #$33table offset
leax table,pc
ldb b,xkey code
puls x
lbra contback to original code

tablefdb $0117A, W
fdb $02320, Break

crcfcb $7Bnew CRC value
fcb $4C
fcb $5E
```

Skala has also written RAMdisk drivers for the J & R Banker board. He and Bill Goode, who wrote the drivers we published several months ago, are in the same users group. Skala's drivers are fully bootable in an entirely legal way. They use less than one page of memory in the boot file and one page of the lowest available memory. He has also written an initialization routine that formats an entire RAMdisk in less than a second. I'm impressed. And, he has a duplication routine that lets you rapidly copy an entire floppy disk to the RAMdisk, even though the formats are different. This means you can use all of the space available on the RAMdisk.

If you own a J & R Banker and would like this software, send Skala $4 and a self-addressed disk mailer.

More Tips From Steve Goldberg

Steve Goldberg wrote recently to say the response to his *Utilipak* package has been tremendous and to let you know the package has now been upgraded for use with OS-9 Version 2.00.00. He has added a new *alarm* utility and a procedure file that adds descriptions of all *Utilipak* commands to the Cmds.Hp file that comes with Version 2.00.00. The price for *Utilipak* is still only $25. And, if you bought the earlier version, you can get a copy of the new version by sending Goldberg a blank disk with a stamped return mailer. That's an upgrade bargain!

Steve enclosed a change to the modification of the *Rep* utility we published recently that causes the program to first look for the module in RAM and only attempt to load it from disk if it is not present in memory. This means you can load all the utilities you want to repeat together with *Rep* and then switch to a different disk. This is essential for users with only one drive.

In *Rep*'s load module add these lines

Listing 3: *deiniz*

```
*****************************************************
*
* DEINIZ  -  COPYRIGHT (c) 1986 by S.B.GOLDBERG
*
* Returns device buffer(s) initialized by 'Iniz' to user RAM.
*
* Use: deiniz <devicename> [...]
*
         ifpl
         use   /d0/defs/os9defs
         endc
*
         mod   len,name,prgrm+objct,reent+1,entry,dsiz
*
pointer  rmb   2   parameter pointer
         rmb   200   stack
         rmb   200   params
dsiz     equ   .
*
name     fcs   /deiniz/
         fcc   /(c) 1986 S.B.GOLDBERG/
********************************
*
* CHECK FOR PARAMETERS
*
entry    lda   ,x   get parameter character
         cmpa  #$0d   parameter present?
         beq   prompt   no, prompt and quit
********************************
*
* MAIN PROGRAM LOOP
*
doit     stx   pointer   yes, sve devname address
         clra   use device capabilities
         os9   i$attach   attach to get table addr.
         bcs   error   branch on error
         os9   i$detach   detach device
         bcs   out   quit with error
         os9   i$detach   destach again
         bcs   out   quit with error
chkmore  lda   ,x+   get next param.
         cmpa  #$20   space?
         beq   chkmore   yes, look again
         leax  -1,x   no, reset pointer
         cmpa  #$0d   another param?
         bne   doit   yes, do again
noerr    clrb   no, clear error flag
out      os9   f$exit   quit
********************************
*
* ERROR CHECK ROUTINE
*
error    cmpb  #221   no module error?
         beq   loop  yes, display bad devname
         bsr   screen   display quit point
         bra   out   quit with error
loop     lda   ,x+   yes, get param. char.
         cmpa  #$20   end of param?
         bhi   loop   no, try again
         leax  -1,x   yes, reset to end of param.
         pshs  x   save end address
         tfr   x,d   put in D register
         subd  pointer   subtract start address
         tfr   d,y   put length in Y register
         ldx   pointer   address of param start
```

immediately after the `pshs u` instruction.

```
os9 f$link
bcc saveit
cmpb #221 module not available error code
bne out
```

Also add the label saveit to the beginning of the second line below.

```
bcs out               exit with error
saveit stu head       save header address
puls uretrieve        U register
```

This Month's Program Listings

Steve Goldberg hates large, blank, unblinking block cursors like the one generated by the new CO80 module which lets PBJ's WordPak work with OS-9 Version 2.00.00, so he wrote a patch. Since it is one byte longer than the original, you must do the patch before putting the module in the OS-9 boot file. Just create the procedure file *CursorFix* with build or edit and run it. The assembly listing, *Cursor*, lets you instantly change the cursor type at any time after CO80 has been patched with *Cursorfix*.

OS-9 Version 2.00.00 gives you an Iniz utility to initialize device buffers at startup to prevent memory fragmentation. It does not include a Deiniz to let you grab back a page of unused buffer space. Goldberg wrote one. It works with Version 2.00.00 only.

We have an international contributor this month. Margo H. Guda of Curacao, Netherlands Antilles sent us two BASIC09 listings. Menu can help make programming easier. *Printplaatje* is a screen dump utility to send a graphics screen to the printer.

He also sent the following patches. They let Radio Shack's *OS-9 Screen Dump* program work with FHL's Hi-Res in memory. He took out the automatic logo printing and changed the option check list so the options are processed in lowercase.

offset	old	new
b5	76	00
130	53	73
13A	49	69
142	43	63

He noted that his DMP-120 printer has problems with the double width size used by the screen dump program so he changed it to print in condensed mode by changing the byte at an offset of 94 from 17 to 14.

And Finally, More Assembly and C Comparisons

This month we feature two more of Kevin Kuehl's utility programs in assembly language and C. Display is like the utility that comes with OS-9 except that it also accepts decimal and octal numbers. *CP* is a UNIX-like copy utility that copies a group of files into a directory or one file into another. Rather than delete the new file if it already it exists, it appends the new information to the end of the existing file. These programs give an excellent insight into how to write OS-9 utilities in either assembly or C.

Next Month

My gray CoCo gave up the ghost recently and I now am the proud owner of a new white CoCo 2 with a matching expansion interface. Hopefully, I will be able to get on with my evaluation of Tandy's new 15-megabyte hard disk now and the fantastic new DISTO hardware from CRC so I can give you a report next month. Till then, keep on hacking. ☐

```
         bsr    screen2   display bad device name
         leax   nomod,pcr   address oferror message
         bsr    screen   put on screen
         puls   x   retrieve param. pointer
         bra    chkmore   look for more params
********************************
*
* IF NO PARAMETERS PRESENT
*
prompt   leax   pmpt,pcr   address of syntax prompt
 f        bsr    screen   put prompt on screen
         bra    noerr   quit
********************************
*
* SCREEN PRINT ROUTINE
*
screen   ldy    #255   max. length of prompt
screen2  lda    #2   standard error path
         os9    i$writln   put on screen
        bcs    out   quit with error
         rts
*
pmpt     fcc    /Use: deiniz <dev.name> [...]/
         fcb    $0a
         fcc    /     release device buffer(s)/
         fcb    $0d
nomod    fcc    /: device not found/
         fcb    $0d
         emod
len       equ    *
```

Listing 4: *menu*

```
PROCEDURE menu
PARAM choice:STRING[100]; u:INTEGER
DIM workchoice:STRING[100]
DIM i:INTEGER
DIM choices(20):STRING
workchoice=choice
GOSUB 10
PRINT CHR$(12)
PRINT
PRINT TAB(18),"** Menu **" \ PRINT
i=1
WHILE choices(i)<>"" DO
PRINT TAB(10),i; " :"; choices(i)
i=i+1
ENDWHILE
PRINT
u=0
WHILE u<1 OR u>i-1 DO
INPUT "Enter your choice: ",u
ENDWHILE
choice=workchoice
END
10 (* convert string choice into array
FOR i=1 TO 20 \choices(i)="" \NEXT i
i=1
REPEAT
choices(i)=LEFT$(choice,SUBSTR("/",choice)-1)
choice=RIGHT$(choice,LEN(choice)-SUBSTR("/",choice))
i=i+1
UNTIL i>=20 OR SUBSTR("/",choice)=0
choices(i)=choice
RETURN
```

Listing 5: ***printplaatje***

```
PROCEDURE PrintPlaatje
BASE 0
DIM path:BYTE
DIM x,y,yc,c,color,g,t(7):INTEGER
DIM char(256):STRING[1]
DIM space:STRING[112]
FOR c=0 TO 6 \t(c)=2^(6-c) \NEXT c
space="" \ FOR y=1 TO 112 \space=space+CHR$(128) \NEXT y
OPEN #path,"/p":WRITE
FOR y=1 TO 4 \ PRINT #path \NEXT y
PRINT #path,CHR$(18)
FOR y=1 TO 4 \ PRINT #path \NEXT y
FOR y=189 TO 0 STEP -7 \ FOR x=0 TO 255 \g=128
FOR c=0 TO 6
yc=y+c
IF yc<191 THEN
RUN gfx("gcolr",x,yc,color)
IF color=5 THEN g=g+t(c) \ ENDIF
ENDIF
NEXT c
char(x)=CHR$(g)
NEXT x
PUT #path,space
PUT #path,char
PRINT #path
NEXT y
PRINT #path,CHR$(30)
FOR y=1 TO 10 \ PRINT #path \NEXT y
CLOSE #path
END
```

Listing 6: ***display a***

```
* DISPLAY:  a replacement utility that displays the HEXADECIMAL, DECIMAL
*           or OCTAL value typed.
* 6809 Assembly Language
*
* Kevin Kuehl
* 806 Division Road
* Valparaiso, IN 46383
* February 5, 1986
*
* CALLS:  display C     Clears the screen (HEX parameter)
*         display 0d12  Clears the screen (DEC parameter)
*         display 0o14  Clears the screen (OCT parameter)
*
 NAM Display

 IFP1
 USE /D0/DEFS/OS9Defs
 ENDC

 MOD disend,disnam,PRGRM+OBJCT,REENT+1,disent,dismem
disnam FCS /Display/

***********************************
*
* DATA AREA
*
 ORG 0
```

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```
***********************************
*
* PROGRAM AREA
*
disent LDA #16 get HEX conversion factor
 STA convfac save as default value
 CLR total total = 0
dis05 LDA ,X+ get next parameter character
 CMPA #$0D are we at its end?
 BEQ ending yes, then go
 CMPA #$20 do we have 'WHITE SPACE'?
 BEQ dis05 yes, then get next one
 CMPA #'0 do we convert to HEXADECIMAL?
 BEQ convloop no, then go
 LEAX -1,X push back to last character
 BRA convlp10 convert to HEXADECIMAL
***********************************
*
* CONVERT
*
convloop LDB #10 get DECIMAL 'convfac'
 LDA ,X+ get next character
 ANDA #%11011111 convert it to UPPER CASE
 CMPA #'D do we convert DECIMAL?
 BEQ convlp05 yes, then go
 LDB #8 get OCTAL 'convfac'
 CMPA #'O do we convert OCTAL?
 BNE errmsg no, then syntax error
convlp05 STB convfac save the conversion factor
convlp10 LDA ,X+ get thenext character
 CMPA #$0D are we done?
 BEQ dispit yes, then go
 CMPA #$20 are we done?
 BEQ dispit yes, then go
 CMPA #'9 is conversion easy?
 BLS convlp15 yes, then go
 ANDA #%11011111 convert to UPPER CASE
 SUBA #'A are we within limit?
 BLO errmsg no,e then go
 ADDA #'0+10 make number linear from '0'
convlp15 SUBA #'0 are we within the limit?
 BLO errmsg no, then go
 CMPA convfac are we within the limit?
 BHS errmsg no, then go
 STA -1,S save for a bit
 LDA total get old total
 LDB convfac get the conversion factor
 MUL and convert it
 ADDB -1,S add in new number
 STB total and save as new total
 BRA convlp10 and go for some more



*********************************
*
* DISPLAY THE PARAMETER
*
dispit STX prmptr save the pointer
 LEAX total,U point to the number
 LDY #1 it is a single byte number
 LDA #1 use standard output
 OS9 I$WRITE and print it
 BCS error branch on error
 LDX prmptr get the pointer
 LDA -1,X get last character
 CMPA #$0D are we done?

 BNE disent no, then let's go
ending CLRB clear the error channel
error OS9 F$EXIT leave the program

errmsg LEAX message,PCR point to the message
 LDY #120 get its length
 LDA #2 use STANDARD ERROR path
 CLRB clear the error channel
 OS9 I$WRITLN print the message
 BRA error exit the program

message FCC /Usage: display xx 0Dxxx 0Oxxx/
 FCB $0D

 EMOD end of module
disend EQU * end of program
 END

convfac RMB 1
total RMB 1
prmptr RMB 2
 RMB 200 Parameter Area
 RMB 200 Stack Area
dismem EQU .
```

Two-Liner Contest Winner . . .

This little ditty prints out a calendar for 1987. To send the output to the screen instead of the printer, change D=2 to D=0 in Line 10. To change to the 1986 calendar, change the year and make T=12 in Line 10. To change it for 1988, make T=20 and change the year in Line 10. Also, change FEBRUARY,28 to FEBRUARY,29 in Line 20. Boy, this one has versatility!

The listing:

```
10 D=2:T=16:CLS:DIM A$(12),A(12)
:FOR B=1 TO 12:READ A$(B),A(B):N
EXT B:FOR C=1 TO 12:PRINT#-D,A$(
C);TAB(22)"1987":PRINT#-D:PRINT#
-D," S   M   T   W   T   F   S":
FOR B=1 TO A(C):IF T>24 THEN T=0
:PRINT#-D
20 PRINT#-D,TAB(T) RIGHT$(STR$(B
),2);:T=T+4:NEXT B:PRINT#-D:PRIN
T#-D:NEXT C:DATA JANUARY,31,FEBR
UARY,28,MARCH,31,APRIL,30,MAY,31
,JUNE,30,JULY,31,AUGUST,31,SEPTE
MBER,30,OCTOBER,31,NOVEMBER,30,D
ECEMBER,31:REM 1987 CALENDAR BY
MICHAEL B. KROMEKE
```

Michael B. Kromeke
Albuquerque, NM

(For this winning two-liner contest entry, the author has been sent copies of both *The Rainbow Book of Simulations* and its companion *The Rainbow Simulations Tape.*)

Listing 7: *display c*

```
/* DISPLAY:  A replacement utility for the standard DISPLAY that accepts
             HEX, DEC, and OCTAL arguments.

    Kevin Kuehl
    806 Division Road
    Valparaiso, IN 46383
    December 28, 1985

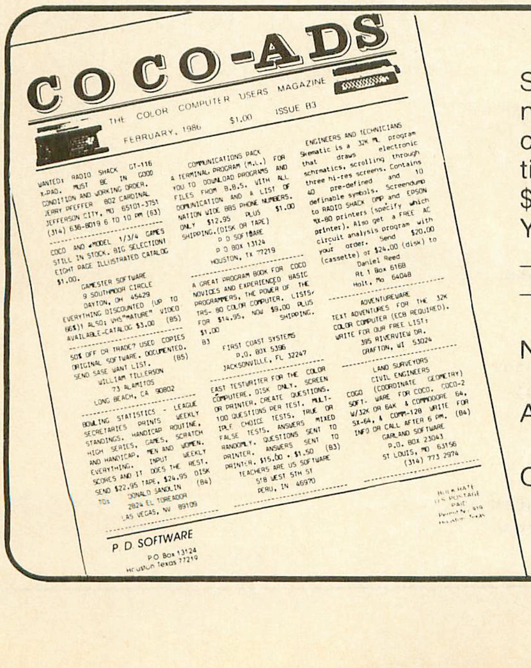
    Calls:   Display C     clears the screen in HEXADECIMAL
             Display 0d12 clears the screen in DECIMAL
             Display 0o14 clears the screen in OCTAL
                                                                  */
#include <stdio.h>

main(argc, argv)
int argc;
char **argv;
{

     if (argc == 1) {
          fprintf(stderr,"Usage: display [xx 0dxxx 0oxxx]\n");
          exit(0);
     }

     while (--argc > 0)
          if ((*++argv)[0] == '0') {
               if (((*argv)[1] == 'd') || ((*argv)[1] == 'D'))
                    numloop(&((*argv)[2]), 10);
               else if (((*argv)[1] == 'o') || ((*argv)[1] == 'O'))
                    numloop(&((*argv)[2]), 8);
          } else
               numloop(*argv, 16);
}

/* Convert 's' into its HEX, DEC, or OCT equivalent */
```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```
numloop(s, conv)
char *s;
int conv;
{
     int total = 0;

     while ((*s >= '0' && *s <= '9') ||
              (*s >= 'A' && *s <= 'F') ||
              (*s >= 'a' && *s <= 'f'))
          if (*s >= '0' && *s <= '9')
               total = total * conv + *s++ -'0';
          else if (*s >= 'A' && *s <= 'F')
               total = total * conv + *s++ + 10 - 'A';
          else
               total = total * conv + *s++ +10 - 'a';
               putchar(total);
     }
```

Listing 8: *cpa*

```
* CP: A UNIX-like file copy utility.
* 6809 Assembly Language
*
* Kevin Kuehl
* 806 Division Road
* Valparaiso, IN 46383
* February 5, 1986
*
* Calls:  cp file1 file2  copies from 'file1' to 'file2', appends to end of
*                         'file2' if it exists already.
*         cp file1 dir1   copies from 'file1' to 'dir1/file1', appends to
*                         end of 'dir1/file1' if it exists already.
*
 NAM Cp

 IFP1
 USE /D0/DEFS/OS9Defs
 ENDC

 MOD cpend,cpnam,PRGRM+OBJCT,REENT+1,cpent,cpmem
cpnam FCS /Cp/

***********************************
*
* DATA AREA
*
attrs EQU %00000111 exec, write, read attributes
 ORG 0
path1 RMB 1
path2 RMB 1
address RMB 2
prmptr RMB 2
fname RMB 50
buffer RMB 512
 RMB 200 Parameter Area
 RMB 200 Stack Area
cpmem EQU

***********************************
*
* PROGRAM AREA
*
cpent STX prmptr save the pointer
cp05 LDA ,X+ get next character
 CMPA #$0D are we done?
 BEQ cp10 yes, then go
 CMPA #$20 or at a new name?
 BNE cp05 no, the get another
 STX address save the new pointer
 BRA cp05 and see if we are done
```

```
cp10 LDX prmptr get the pointer
 LDA #READ. use READ access mode
 OS9 I$OPEN open the file
 LBCS error branch on error
 STA path1 save the path number
 PSHS X save the pointer
 LDX address get the new pointer
 LDA #DIR.+READ. use DIRECTORY READ access mode
 OS9 I$OPEN check to see if it exists
 BCC cp20 yes, then go
 PULS X get the pointer
 STX prmptr save the parameter pointer
 LDA #UPDAT. use UPDATE access mode
 OS9 I$OPEN does file exist?
 BCC cp15 yes, then go
 LDX prmptr else get the pointer
 LDA #UPDAT. use UPDATE access mode
 LDB #attrs get its attributes
 OS9 I$CREATE create the file
 LBCS error branch on error
cp15 CLR prmptr set to regular copy
 BRA cp40 and copy the files

************************************
*
* COPY TO A DIRECTORY
*
cp20 OS9 I$CLOSE close the directory
 LBCS error branch on error
 LDX address get the parameter pointer
 LEAY fname,U point to the file name
cp25 LDA ,X+ get next character
 CMPA #$0D are we done?
 BEQ cp30 yes, then go
 CMPA #$20 are we done?
 BEQ cp30 yes, then go
 STA ,Y+ save it in string
 BRA cp25 go for some more
cp30 LDA #'/ get a separator
 STA ,Y+ and save in string
 LDX prmptr get the pointer
cp35 LDA ,X+ get next character
 STA ,Y+ save it in string
 CMPA #$20 are we done?
 BNE cp35 no, then go
 STX prmptr save the pointer
 LEAX fname,U point to file name
 LDA #UPDAT. use UPDATE access mode
 OS9 I$OPEN does file exist?
 BCC cp40 yes, then go

 LEAX fname,U point to file name
 LDA #UPDAT. use UPDATE access mode
 LDB #attrs get its attributes
 OS9 I$CREATE make the file
 BCS error branch on error
cp40 STA path2 save the path number
 BSR copy copy the files
 LDA path1 get the path number
 OS9 I$CLOSE close the file
 BCS error branch on error
 LDA path2 get the path number
 OS9 I$CLOSE close the file
 BCS error yes, then go
 CLRB clear the error channel
 TST prmptr did we do a regular copy?
```

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MAKE CHECKS PAYABLE TO E.D.C.

```
 BEQ error yes, then go
 LDX address get the dir. name address
 CMPX prmptr are we done?
 BEQ error yes, then leave
 LBRA cp10 and copy the next file

*********************************
*
* COPY THE FILES
*
copy PSHS U save the pointer
 LDA path2 get the path number
 LDB #$02 get the status number
 OS9 I$GETSTT read in information
 BCS error branch on error
 OS9 I$SEEK seek to part of file
 BCS error branch on error
 PULS U get the old pointer
copy05 LEAX buffer,U point to the buffer
 LDY #512 get its length
 LDA path1 get the path number
 OS9 I$READ read the file
 BCS copyerr branch on error
 LEAX buffer,U point to the buffer
 LDA path2 get the path number
 OS9 I$WRITE print it in file
 BCC copy05 no errors, then read more
copyerr CMPB #E$EOF is error an End Of File?
 BNE error no, then go
 RTS ReTurn from Subroutine

error OS9 F$EXIT terminate the process

 EMOD end of Module
cpend EQU * end of Program

 END
```

Listing 9: ***cpc***

```
/* CP: A UNIX-like file copy utility.  Can copy multiple files in a directory
       and append on the end of an already existing file.
   Microware C Language

   Kevin Kuehl
   806 Division Road
   Valparaiso, IN 46383
   February 5, 1986

   Calls:    cp file1 file2    copies 'file1' to 'file2', appends to the end
                               of 'file2' if it exists already.
             cp file1 dir1     copies 'file1' to 'dir1/file1', appends to the
                               end of 'dir1/file1' if it exsts already.
                                                                            */

#include <stdio.h>
#include <modes.h>

main(argc, argv)
int argc;
char **argv;
{
     int pn1, pn2;
     int ptr = argc - 1;
     int length = strlen(argv[ptr]);
     intx i = 0;

     if (argc == 1)
          error("Usage: cp file1 file2 OR cp file1 ... directory1", NULL);

     else if (access(argv[ptr], S_IFDIR) == -1) {
          if ((pn1 = open(argv[1], _READ)) == -1)
               error("Can't open", argv[1]);
          else if (access(argv[2], S_IWRITE + S_IREAD) == -1) {
               if ((pn2 = creat(argv[2], S_IWRITE + S_IREAD)) == -1)
                    error("Can't make", argv[2]);
          } else if ((pn2 = open(argv[2], _WRITE + _READ)) == -1)
               error("Can't open", argv[2]);
```

```
         copy(pn1, pn2);
         close(pn1);
         close(pn2);

    } else
         while (--argc > 1) {
              stradd(argv[ptr], "/", length);
              strcat(argv[ptr], argv[++i]);

              if ((pn1 = open(argv[i], _READ)) == -1)
                   error("Can't open", argv[i]);
              else if (access(argv[ptr], S_IWRITE + S_IREAD) == -1) {
                   if ((pn2 = creat(argv[ptr], S_IWRITE + S_IREAD)) == -1)

                        error("Can't make", argv[ptr]);
               } else if ((pn2 = open(argv[ptr], _WRITE + _READ)) == -1)
                    error("Can't open", argv[ptr]);

               copy(pn1, pn2);
               close(pn1);
               close(pn2);
           }
}

copy(pn1, pn2)
int pn1, pn2;
{
     char buffer[512];
     int length;

     lseek(pn2, 01, 2);

     while ((length = read(pn1, buffer, 512)) > 0)
          write(pn2, buffer, length);
}

error(err1, err2)
char *err1, *err2;
{
     fprintf(stderr, "CP: %s %s\n", err1, err2);
     exit(0);
}

stradd(ptr1, ptr2, len)
char *ptr1, *ptr2;
int len;
{
     int i = 0;

     while (i++ < len)
          *ptr1++;

     while (*ptr2 != '\0')
          *ptr1++ = *ptr2++;

    *ptr1 = '\0';
}
```

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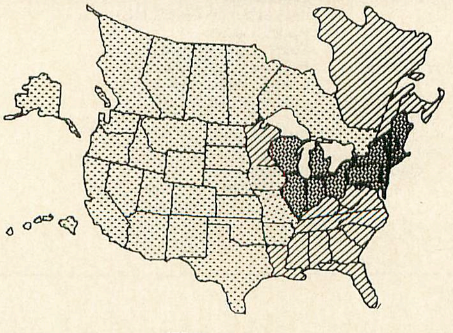

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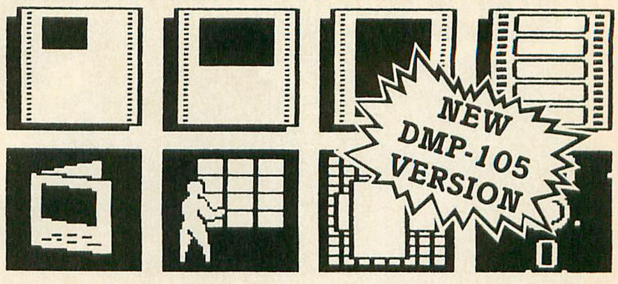

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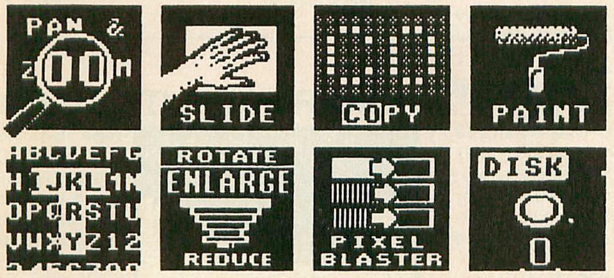

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NEW LOW PRICE! GRAPHICOM DIGITIZER $159.00

Input directly into Graphicom for easy enhancements, manipulation, stamping, and storage. Accepts composite video signal in (1.0v p-p) from video camera, VCR, video disc player, another computer, or other compatible video sources. View "off air" or "VCR" digitized video at close to real-time. "Snapshot" video frames to the digitizer's internal memory. No slow, data serial manipulation.

Use with your multi-pak, "Y" box, or a "Y" cable ("Y" cable available at $19.95)

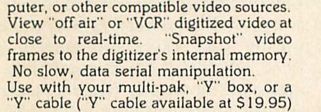
Video is input via a "BNC" connector.

External controls for HORIZONTAL POSITION, VERTICAL POSITION, HORIZONTAL WIDTH, BRIGHTNESS, and CONTRAST (FUZZ) settings.

Don't be fooled by imitations...this is the GRAPHICOM VIDEO DIGITIZER . . . the **only** digitizer that "DIRECTLY" inputs into Graphicom

REQUIRES 64K COCO, 1 DISK DRIVE, AND 2 ANALOG JOYSTICKS. FREE GRAPHICOM PROGRAM, PICTURE DISK, AND GRAPHICOM UTILITY SUPPLIED WITH PURCHASE OF VIDEO DIGITIZER (A $50 VALUE).

"Y" BOX



$29.95

GRAPHICOM $24.95

Catalog No. 111GD

Simply stated - One of the finest graphic programs written for the Color Computer!

FEATURES:

- S-U-P-E-R U-S-E-R F-R-I-E-N-D-L-Y !
- Supports 4 Hi-Res display modes
- 4 page animation mode
- Color Palette with over 15 color patterns for use with Hi-Res artifact
- Send/Receive pictures over modem
- Supplied utility allows capturing Hi-Res screens from most COCO arcade games
- Multiple Hi-Res character fonts (user redefinable)
- Supplied utility for transferring Graphicom screens to Basic or other M/L programs.
- Supplied utility for loading screens from Basic or other sources
- Built in Hi-Res SCREEN PRINT (compatible with EPSON, C-ITOH, GEMINI-10, OKI, plus Radio Shack's LP-VII, LP-VIII, DMP-100, DMP-200, and GCP-115 printers) from 110 to 9600 baud
- SEND/RECEIVE slow-scan television
- Many additional features, operating hints, hardware mod's and suggestions, etc.

REQUIRES 64K COCO, 1 DISK DRIVE, AND 2 ANALOG JOYSTICKS

NEW MASTER KEY II

New Improved Version! A hardware product that takes control of any program regardless of protection. Now use with RS Multi-pak, "Y" cable or **optional** extender cable. Captures register contants as they were when Master Key II was engaged. Complete disassembler, memory save, and much more. Requires some familiarity with Assembly Language.

ROM PAK Cat. No. 160HR . . . . $ 99.95
Cat. No. 161HR With Ext. Cable . . . $109.95

PICTURE DISK SETS

Available from COMPUTIZE

4C - Artifact color palette
5C - Large character sets (from Derringer Software)
6C - Same as 5C but set up as stamp set
Picture Disk Set 1 . . . . $19.95
7 - Miscellaneous Art Set #1
8 - Miscellaneous Art Set #2
9 - Miscellaneous Ads and Examples
Picture Disk Set 2 . . . . $19.95
10 - Miscellaneous Fonts
11C - Artifact color palette type fonts
Picture Disk Set 3 . . . . $14.95
12C - Art demo from WHITESMITH
13C - GRAPHICOM PART II function demo
Picture Disk Set 4 . . . . $14.95

GC II FONT DISKS

Each disk contains 10 or more fonts. (4 versions of each font, one for each display mode).

14C - GCII Fonts Disk #1
15C - GCII Fonts Disk #2
16C - GCII Fonts Disk #3
GRAPHICOM PART II Font Disks . . . $19.95

TRIPLE TRANSFER UTILITY ©

Transfer contents of disk to tape • Transfer contents of tape to disk • Automatically relocates cassette programs that conflict with the disk operating system • Displays machine language program addresses • Copies ASCII, Basic, & Machine Language Programs • All contained in 1 menu driven program!

REQUIRES 32K CC EXT.

Cassette $19.95 . . Cat. No. 105CT
Disk $24.95 . . . . Cat. No. 105CD

SUPER BACK-UP UTILITY ©

. . . WITH S.B.U. FROM COMPUTIZE — YOU'LL NEVER NEED ANOTHER BACK-UP UTILITY FOR YOUR COCO!!!

SUPER BACK-UP UTILITY WILL PERFORM **ALL** OF THE FOLLOWING FUNCTIONS:

1. **TAPE TO TAPE** (Regardless of most protection schemes!)
2. **TAPE TO DISK** (Move Cassette programs to Disk!)
3. **AUTO RELOCATE** (For those Cassette programs that conflict with Disk operating systems.)
4. **DISK TO TAPE** (Place Disk programs onto Cassette)
5. **DISK TO DISK** (Our powerful Split-N-Image Program, Copies regardless of most protection schemes!)

- **MENU DRIVEN**
- **REQUIRES 32K EXTENDED COCO**
- **REQUIRES 1 OR 2 DRIVES**
- **ALL MACHINE LANGUAGE!!!**

COMPARE WITH OTHER INDIVIDUAL PROGRAMS COSTING IN EXCESS OF $100.00

DISK $49.95 . . . . Cat. No. 107CD

SPIT-N-IMAGE ©

M/L Disk Back-Up Utility

There is no need to suffer the heartbreak of crashed disks any longer. Spit-N-Image will create a mirror image of your valuable disk programs which do not respond to normal back-up functions. Will also initialize and back-up in one pass. Data processing experts always insist on having a back-up — it's good a practice.

REQUIRES 32K CC

DISK $34.95 . . . . Cat. No. 101CD

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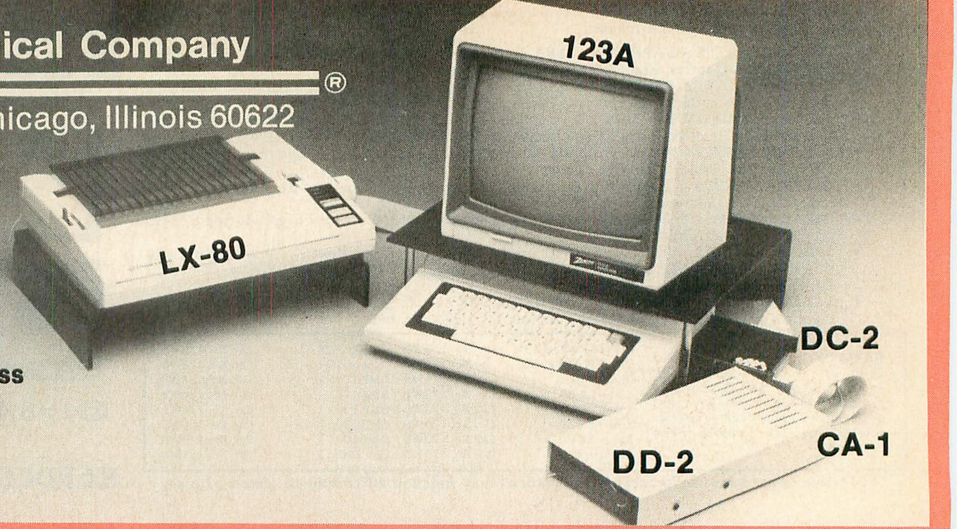


New Dual Mode EPSON

The new Epson LX-80 offers printing flexibility in two modes: one mode allows you to print in a quick (100 cps) dot-matrix style for programming and graphics, and the Near Letter Quality mode (16 cps) produces precise (240 dots per inch), beautiful type for correspondence, reports, and similar purposes. The LX-80 offers 160 different type-style combinations, including Pica, Elite, Enlarged, Emphasized, Condensed, Subscripts and Superscripts, and type-styles can be selected quickly from the top control panel or from program control. Comes standard in friction feed; tractor option is also available.

LX-P package includes an LX-80, a serial interface, a Color Computer to Epson cable, and Printer Tutorial that teaches you how to program the different type styles ($29.95 value).

LX-P: LX-80 package $317 ($7 shpg)

ET-1 tractor option for LX-80. $29.50.

SF-1 Single-sheet feeder for the LX-80. $145 ($7 shpg)

Epson	RX-80 FT	repack	$207.
Epson	LX-80 New		$249.
Botek	Serial to parallel converter		$68.45
Howard	CoCo to Epson cable		$25.

DM-1	Disk mailer holds from one to five diskettes 200 lb. cardboard construction 25 mailers/box	**$20.**

MONITORS

123 Zenith 12" Green Screen, 640 dots x 200 dots resolution, 15 MHz band width. **$114** ($7 shpg)

123A Zenith 12" Green Screen Special, $67.50 ($7 shpg) 80 Column non glare

122 Zenith 12" Amber Screen, 640 dots x 200 dots resolution, 15 MHz band width. **$117** (7 shpg)

141 Roland 13" Color Monitor with speaker, 270 dots x 200 dots resolution, 4MHz band width **$247** ($12 shpg)

All monitors require video controller.
Reverse video free with monitor order.

MEMORY

64K Upgrades—1 Year Warranty

64-E1 for E Boards with complete instructions. Remove old chips and replace with preassembled package—no soldering or trace cuts. **$28.45** ($2 shpg)

64-F1 for F Boards. No soldering needed. Capacitor leads must be cut. **$24.45** ($2 shpg)

64-2 for COCO 2. Kit requires one solder point, no trace cuts. **$24.45** ($2 shpg)

CONTROLLERS

New Controller from J&M: Has switch that allows either JDOS or RS DOS to be the disk operating system; eliminates software compatibility problems, while preserving the advantages of J&M's gold contacts and data separator. Also added to the DC-2 is a parallel port, which means a serial interface is no longer needed to make a parallel printer (like the Epson) work.

DC-2 Disk Controller with JDOS. **$128** ($2 shpg)

RS-1: RS DOS ROM Chip. $20.00 ($2 shpg)

DC-1 Disk Controller reads and writes to 35 and 40 track single and double-sided drives for *all* models of the Color Computer w/ JDOS. **$128** ($2 shpg)

VC-1 Video Interface mounts inside Color Computer by piggy-backing IC on top of interface—no soldering, no trace cuts. All models give composite video & sound. **$24.45** ($2 shpg)

VC-2 for COCO 2—mono only. **$26.45** ($2 shpg)

VC-3 for COCO 2—both color or monochrome **$39.45** ($2 shpg)

VC-4 for new Color Computer (no sockets, chips are soldered to mother board). Attaches with spring-loaded clips. Color or mono. **$39.45** ($2 shpg)

EPSON AND J&M

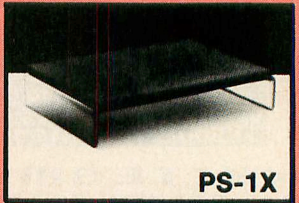
The EJ-P Package

The Epson LX-80 Printer teamed with our new J&M DC-2 Controller gives you top printing capabilities *plus* built-in switch gives JDOS or Radio Shack DOS so all software can run on your Color Computer. Package includes: Epson LX-80 Printer with ET-1 tractor; DC-2 controller; parallel Color Computers to J&M cable; Epson Printer Tutorial ($29.95 value).

Complete EJ-P package $425.00 ($7 shpg)

DD-2	Double sided 360K disk with ½ height case & heavy duty power supply	**$188.**
CA-1	Disk drive cable	**$24.50**
CA-2	Two drive cable	**$29.50**
DE-1	Disk enclosure ½ height with power supply	**$58.**

HOWARD QUALITY STANDS



New TS-1X Monitor Stand: Designer-beautiful stand with clear corner posts, easy side access to ROM port, reset and on/off buttons. **$39.50** ($3 shpg)

TS-1: Standard 13" monitor stand for the original Color Computer. Specify black, ivory or clear. 15"×11"×4". **$29.50** ($3 shpg)

TS-2: Same as above for the COCO 2. **$29.50** ($3 shpg)

PS-1X Printer Stand features new noise-suppressing foam top and cork base. 15"×11"×2½". **$24.95** ($3 shpg)

GUARANTEE

Howard Medical's 30-day guarantee is meant to eliminate the uncertainty of dealing with a company through the mail. Once you receive our hardware, try it out; test it for compatibility. If you're not happy with it for any reason, return it in 30 days and we'll give you your money back, (less shipping).

Hours: 8:00-4:00 Mon.-Fri.
10:00-3:00 Sat.

Software system requirements: CoCo with 1 disk, 32K RAM, 80-column printer
Add $2 for shipping.

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SOFTWARE CORNER

PAYROL/BAS 39.95	Automatically calculates FED & FICA and 3 additional user defined deductions. TABLES ARE ALREADY ENTERED.
LEDGER free with PAYROL/BAS	Prints checkbook with up to 30 user definable ledger numbers a $39/VALUE

WITH PAYROL/BAS YOU WILL ALSO WANT

STATE TAX 39.95	Automatically calculates state withholding including graduated taxes. TABLES ALREADY ENTERED
941 29.95	Prints totals by quarter per employee Ideal for Federal 941 and state unemployment
CHECKS	500 pin-feed checks specify blue green or brown $57.25
VIP LIBRARY $125	Softlaw's integrated package includes VIP Write, terminal, Database, Speller and CALC
SAP-II 19.95	Stock analysis program organizes your portfolio and give specific sell & stop-loss points
BPA-1 19.95	Chart your blood pressure from daily readings taken in the comfort of your home.

The Ultimate Color Computer

Enhancements for Productivity from HJL Products

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12" MONOCHROME
Quick Basic Plus
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NUMBERJACK
The HJL Numeric Keypad

To achieve maximum productivity with your Color Computer, you have to make it as easy as possible to get information into and out of the system.

This is why we developed the HJL family of high-performance enhancements for ALL MODELS of the Color Computer.

The Keyboard - $79.95
The overwhelming favorite of serious Color Computer users worldwide, the HJL-57 keyboard has the smooth, consistent feel and reliability you need for maximum speed with minimum input errors. Includes 4 Function Keys and sample function key program. Installs in just a few minutes with no soldering.

The Numeric Keypad - $89.95
The NumberJack is a self-contained, cable-connected keypad for heavy-duty number-crunchers. Besides the number keys, it has all the cursors, symbols and math keys, including autoshifted (one-touch) ADD and MULTIPLY. Comes complete with 3-foot cable and all necessary connectors for quick and easy installation without soldering.

The Monitor Adapter - $25.95
This universal driver works with all monochrome monitors, and is easily installed without clips, jumpers or soldering (except in some later CoCo 2s with soldered-in video chips). Here's crisp, clear, flicker-free monitor output with all the reliability you've come to expect from HJL Products.

The Monitor - $89.95
The GoldStar high-resolution amber monitor brings you the monochrome display that's preferred by most computer professionals today. Once you've used it you'll never connect your computer to a TV set again. The 12-inch diagonal CRT has an etched non-glare faceplate. (Requires adapter sold below)

The BASIC Utility - $25.95
Quick Basic Plus, a high-performance programming utility, can be used with any color computer that has four function keys. 26 pre-defined BASIC statements, 10 user-defined macros at a time (you can save as many sets of macros as you like), automatic line-numbering, word wrap, global search, and instant screen dump to printer, make this software the BASIC programmer's dream come true. Comes with re-legendable 3-way reference chart. Specify disk or cassette.

The HJL Warranty
Every HJL product comes with a full, one-year warranty and the exclusive HJL 15-day unconditional guarantee (except software).

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HEAT UP YOUR COCO!

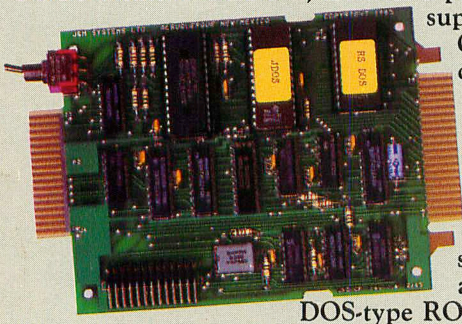
New HARD DRIVES

Besides the obvious advantage of increased disk access speeds and a vast amount of storage, our COCO hard drives boast many innovative features. For instance, you may boot OS/9 directly from JDOS - no intermediate boot floppy is required. Our software can run with virtually any winchester with a ST412 type interface. Our drives have capacities of 5, 10, or 20 MBytes (formatted), and may be either partitioned into up to 7 logical units or left as one large logical unit. Our COCO hard drive systems are complete with case, power supply, cables, OS/9 drivers, and instructions. Prerequisite: OS/9, JFD-CP controller.

5¼" 5 MByte full size	$495
5¼" 10 MByte ½ size	$650
3½" 20 MByte (shown above)	$795

JFD-CP DISK CONTROLLER

Our new JFD-CP, compatible with both the original COCO and the COCO 2, features a parallel port to support a Centronics compatible printer or our hard drive, and an external ROM switch, which allows you to select JDOS or an optional RS DOS-type ROM. It comes in a case and includes JDOS 1.2 and manual. JDOS implements all RS DOS commands, plus many more, including auto line numbering, error trapping, baud rate selection, OS/9* boot from floppy or hard drive, and Memory Minder**, our disk drive analysis program (Precision Alignment Disk not included).



JFD-CP Disk Controller with JDOS	$139

COCO-CLASSIC

Our old JFD-COCO controller remains a strong seller. Some people just like old "classics" best! So we have brought it back at the lowest price ever!

JFD-COCO Disk Controller with JDOS	$99

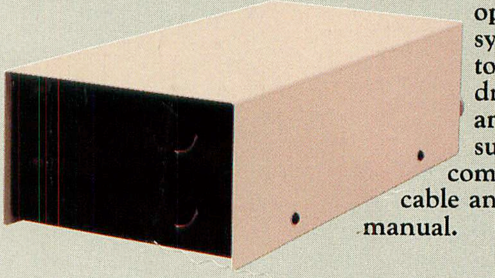
New TERMS

One-year warranty on parts & labor; 30-day money back guarantee (except shipping) if not totally satisfied. Items must be returned in like new condition.

Free shipping via UPS in continental United States for payment by VISA, MasterCard, or cashiers check. COD requires 10% prepayment by bank card plus 3% shipping. Blue Label and foreign shipping extra.

DRIVE SYSTEMS

Upgrade your Color Computer by adding our new JFD-CP disk controller, supercharged with JDOS 1.2 operating system, and a top quality drive with case and power supply. Comes complete with cable and JDOS manual.



Drive 0 System with one single side drive	$279
Drive 0 System with one double side drive	$349
Drive 0,1 System with two single side drives	$389
Drive 0,1 System with two double side drives	$489

MEMORY MINDER**

Memory Minder is a disk drive test program now included in JDOS. Used with a Precision Alignment Disk, Memory Minder allows you to check your drives for speed, alignment, sensitivity, hysteresis, and more! You can actually align or adjust the drives while viewing the graphics on the screen. No special equipment needed!

memory minder
A DISK DRIVE ANALYZER
J&M SYSTEMS, LTD.
Dysan
DDD
CE Division

PRECISION ALIGNMENT DISKS (From Dysan)

PAD-40X1: Tests single side disk drives	$26
PAD-40X2: Tests double/single disk drives	$33

Memory Minder is available on diskette for those who don't own a JFD-CP controller with JDOS. Includes Precision Alignment disk.

Memory Minder: single side package	$59
Memory Minder: single/double side package	$75

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